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In cooperation with  
Ohio Department of  
Natural Resources,  
Division of Soil and Water  
Conservation; Ohio  
Agricultural Research and  
Development Center;  
Ohio State University  
Extension; Allen Soil and  
Water Conservation  
District; and Allen County  
Commissioners

# Soil Survey of Allen County, Ohio





# How To Use This Soil Survey

## General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

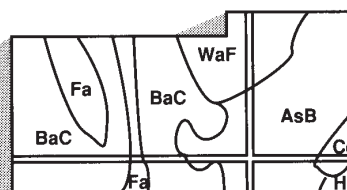
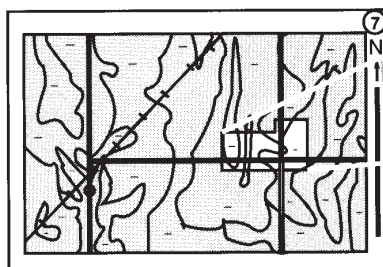
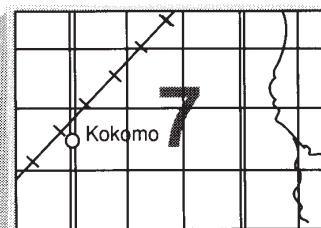
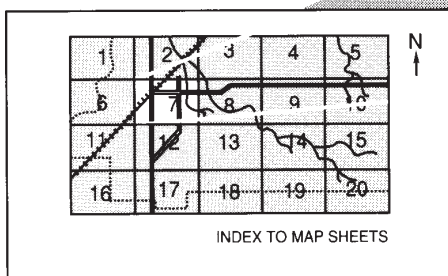
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

## Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1997. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This survey was made cooperatively by the Natural Resources Conservation Service; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; the Ohio Agricultural Research and Development Center; the Ohio State University Extension; and the Allen County Commissioners. It is part of the technical assistance provided to the Allen Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

A State Geographic Database (SSURGO) is available for the county. This database consists of a soil map at a scale of 1:250,000 and descriptions of groups of associated soils. It replaces the general soil map published in older soil surveys. The map and the database can be used for multi-county planning, and map output can be tailored for a specific use. More information about SSURGO for this county, or any portion of Ohio, is available at the local office of the Natural Resources Conservation Service.

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**Cover photographs (clockwise from upper left): Alfalfa growing in the foreground, and a farmstead in the background on Glynwood silt loam, 2 to 6 percent slopes. A housing subdivision on Blount silt loam, 2 to 4 percent slopes, and Pewamo silty clay loam, 0 to 1 percent slopes. The very poorly drained Hoytville soils, which occur in the lake plain region of northern Allen County. A grassed waterway on Blount silt loam, 2 to 4 percent slopes, and Pewamo silty clay loam, 0 to 1 percent slopes.**

*Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.*

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# Foreword

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This soil survey contains information that affects land use planning in Allen County. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Kevin Brown  
State Conservationist  
Natural Resources Conservation Service



# Soil Survey of Allen County, Ohio

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By Donald N. McClure and Jeffrey A. Glanville, Natural Resources Conservation Service, and Rick A. Robbins, Ohio Department of Natural Resources, Division of Soil and Water Conservation

Fieldwork by Donald N. McClure and John R. Allen, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with  
Ohio Department of Natural Resources, Division of Soil and Water Conservation;  
Ohio Agricultural Research and Development Center; Ohio State University Extension;  
Allen Soil and Water Conservation District; and Allen County Commissioners

ALLEN COUNTY is in the northwestern part of Ohio (fig. 1). It is adjacent to Putnam County on the north, Hancock and Hardin Counties on the east, Auglaize County on the south, and Van Wert County on the west. Allen County has an area of 260,340 acres, or about 407 square miles. Lima, the county seat, is located near the center of the county. In 1990, the population of the county was 109,755 and the population of Lima was 45,549 (30).

Most of the county is used for agriculture. The main enterprises are cash-grain farming and some livestock production and dairy operations. In 1997, urban or built-up land made up about 44,400 acres, or about 17 percent of the county (25). The extent of urban areas, especially in areas adjacent to Lima and along the Interstate 75 corridor, is increasing at a rate far beyond that of the rest of the county. Manufacturing is the largest source of employment in the county. The service and retail trade industries are also important sources of employment.

The county is mostly nearly level and gently sloping. The areas of more sloping topography are on end moraines or are related to dissection along streams and river valleys. These areas are in the south-central and eastern parts of the county. Wetness is the main limitation for most of the soils in the county. The hazard of erosion is also a concern in gently sloping or sloping areas.

The county has some locally unique physiographic features. The northern part of the county was the lakebed for Glacial Lake Maumee. Relict beach ridges are obvious along State Route 12. These ridges mark the southern margin of Glacial Lake Maumee. Three distinct end moraines traverse the county in an east-west direction. These areas are more hummocky or rolling than other areas in the county.

This soil survey updates the survey of Allen County published in 1965 (21). It provides more descriptive and interpretive information and has larger maps, which show the soils in greater detail.



Figure 1.—Location of Allen County in Ohio.

## General Nature of the County

This section provides general information about Allen County. It describes history; physiography, relief, and drainage; mineral resources; glacial geology; bedrock geology; farming; industry and transportation; and climate.

## History

Prior to settlement by European immigrants, Native Americans of the Wyandot and Shawnee tribes inhabited the survey area. These people grew corn and other crops in small clearings to supplement their diet.

From the French and Indian War in 1756 until the War of 1812, the survey area had been the scene of hostilities among the Native Americans, the American colonists, the French, and the English. After the defeat of the Native Americans and others in the War of 1812 and the acquisition of Indian lands, European settlement of the county began.

The first settlement in Allen County was at Fort Amanda in 1812. It was established to protect settlers from hostile Native Americans. It was built on the western bank of the Auglaize River. Allen County began its separate existence on February 12, 1820. It was created from Indian Territory. For 11 years, before it became an independent judicial unit, the survey area was attached to Mercer County. Although Lima became the county seat in 1831, the county was not fully organized until March 29, 1842 (19).

A variety of different groups settled throughout the county. Germans mostly settled the Delphos area. The Mennonites settled the Bluffton and Elida areas. In Sugar Creek Township, the Welsh were the dominant group of settlers (19).

Lima was first surveyed in 1831 and soon became the center for business activity in the county. In 1845, with the completion of the Miami and Erie Canal, which passed through Spencerville and Delphos, 15 miles west of Lima, the city secured its first commercial outlet with the outside world. In 1854, the first railroad was built through Lima (3). Oil was discovered in 1885 near Lima and, for a time, Allen County became the oil center of northwestern Ohio. Large oil refineries and other related industries were established, and they have influenced the growth and development of Lima. Today, Allen County is an important center for agriculture, business, and industry in northwestern Ohio.

## Physiography, Relief, and Drainage

Allen County is in two parts of the Central Lowland Physiographic Province. The extreme northwestern part of the county is on the Erie-Huron Lake Plain, and the rest of the county is on the Indiana and Ohio Till Plain (28). The highest elevation in the county is about 1,061 feet above sea level, in Auglaize Township. The lowest elevation is about 760 feet, in Marion Township where the Auglaize River leaves the county.

The relief in the county is quite variable. In the northwest, near Delphos, the landscape is more uniform. This area was once part of a large glacial lake that covered part of the survey area. The glacial deposits were leveled by the wave action of the lake. Hoytville and Nappanee soils are on the flat lake plains of the county. Two major beach ridges, which formed by the wave action of the lake, are along State Route 12 and Ridge Road. The soils on these beach ridges have a high content of sand and gravel.

The majority of the county is part of the Indiana and Ohio Till Plain. The more sloping relief is along the major rivers and on dissected portions of three end moraines. The end moraines are the Fort Wayne, Wabash, and St. Johns moraines. They formed during the last ice age when the ice front remained stationary for a period of time. The less sloping topography reflects the ground moraines, which illustrate the relatively uniform rate of retreat of the glacier. Blount and Pewamo soils occur on the flatter ground moraines. Glynwood and Lybrand soils are on the more rolling terrain. Other soils are on the ground moraines, deltas, and flood plains.

The Auglaize and Ottawa Rivers and their tributaries drain most of Allen County. These two rivers flow northward and are part of the Maumee River basin. A small part of southeastern Allen County drains into the Scioto River watershed.

## Mineral Resources

The natural resources of Allen County include bedrock, water, sand, and gravel. Most of these resources are of minor extent, mainly because of the relatively thin deposits of high-quality materials for wide commercial use. In the 1880's, Lima was the center of oil production for northwestern Ohio.

Dolostone is the major component of bedrock in Allen County, although limestone is also present. These rocks compose the Salina Group, which formed during the Silurian age (16). Dolostone and limestone have been mined in several areas of the county. Quarries near the villages of Bluffton and Delphos and on the east side of Lima are currently active. Dolostone has been quarried for local use from the floor of the Auglaize River during dry years. Since bedrock is at or near the surface in Allen County, many inactive quarries are scattered throughout the county. Most of the dolostone is used for agricultural or industrial uses or for use in the transportation industry.

A few, small sand and/or gravel pits are scattered throughout the county, commonly along rivers and small creeks. Currently, there are no sites in the county being quarried.

## Glacial Geology

Dr. Jane L. Forsyth, Professor Emeritus, Bowling Green State University, and Rick Pavey, Geologist, Ohio Department of Natural Resources, Division of Geological Survey, assisted in the preparation of this section.

About 2 million years ago, glaciers began to move across the survey area in a southern and western direction. Many glacial advances, with ice as much as 1 mile in

thickness, followed by subsequent melting and recessions, filled valleys and low bedrock areas with glacial till and lacustrine sand, silt, and clay. The late Wisconsinan glaciers, approximately 15,000 to 24,000 years ago, were the last glaciers to cover Allen County (8).

Thick layers of glacial material were deposited. As the ice sheet melted and receded, the unsorted material carried by the glacier was deposited in a fairly uniform layer, known as glacial till. The thickness and composition of glacial till vary widely within the county. Soil formation in the till is generally only a few feet thick. Where these till layers were very thin or eroded away, soils formed in older, harder till. Blount, Glynwood, Lybrand, and Pewamo soils are examples of soils that formed in glacial till.

A small portion of Glacial Lake Maumee lies in Allen County. The main body of the lake lies north of State Route 12. Fluctuating lake levels and wave action smoothed out the shallow bottom areas, leveled the glacial till, and provided coarse sediments. As a result, beaches formed. Beach ridges in the survey area are products of these earlier lake levels. Cygnet and Shawtown soils formed in these materials. Hoytville and Nappanee soils formed where the till was leveled by wave action. For the initial level of Lake Maumee, the water reached an approximate level of 800 feet above sea level (7).

Sandy materials occur in several areas that are interpreted to have been deltas built into small, narrow, local ice-marginal lakes higher and slightly older than those of Lake Maumee at its highest. These local lakes are interpreted by Forsyth to have occurred at two different elevations—850 feet and 825 feet (9, 10).

Three end moraines cross Allen County in a general east-west direction (17). The northernmost moraine is the Fort Wayne moraine. The Wabash moraine runs through the central part of the county. The St. Johns moraine is in the extreme southeastern part of the county. Alternating between each end moraine is a corresponding ground moraine which is represented by lower and more level topography.

## Bedrock Geology

Dr. Jane L. Forsyth, Professor Emeritus, Bowling Green State University, and Richard R. Pavey, Geologist, Ohio Department of Natural Resources, Division of Geological Survey, assisted in the preparation of this section.

Allen County is in the eastern part of the Central Lowland Province. Proceeding from west to east in Allen County, the underlying bedrock dips and becomes progressively younger. The bedrock within the county is of sedimentary origin, primarily Silurian (Paleozoic, about 408 to 438 million years old) limestone and dolostone (15).

Bedrock throughout the county is Upper Silurian carbonate sedimentary rocks, mostly dolostone of the Salina Group. The underlying Lower Silurian Dolostone, however, occurs in the buried valley of Wapakoneta Creek, a small preglacial tributary of the ancient Teays River system.

Bedrock topography is relatively level throughout most of Allen County (16). Actual outcrops of bedrock are rare, occurring only in a few scattered quarries. The depth of the rock below the overlying glacial drift, however, is not great, averaging only about 30 to 40 feet, except under end moraines, where the thickness increases to about 100 feet. Streams in the northern part of the county, such as Riley Creek, run on limestone or dolostone bedrock.

The survey area, especially Lima, was part of a historic oil boom in the late 1800's and early 1900's. The area was drilled extensively to recover oil and gas resources. The Trenton limestone member of Ordovician age was the principal reservoir rock utilized for the extraction of oil.

## Farming

In 1994, Allen County had 1,080 farms, which made up about 80 percent of the land in the county. The average size of the farms was about 192 acres (14). In 1994, most farms were about 30 to 500 acres in size, although some were smaller than 10 acres and a few were more than 950 acres.

In 1994, soybeans were grown on 72,600 acres in the county, corn on 54,200 acres, wheat on 25,100 acres, and hay on 4,500 acres (14). A small but increasing acreage in the county is being used for specialty crops, such as popcorn, strawberries, and vegetables for resale. In 1997, about 28,400 acres were used as woodland, including woodland used as pasture (25). The acreage of woodland and pasture has decreased in recent years because of the conversion to cropland and homesite development.

In 1993, approximately 75 percent of the agricultural income in the county was derived from the sale of crops, including nursery crops, greenhouse products, and hay. A little more than 25 percent of the agricultural income was derived from the sale of livestock and livestock products. The chief livestock enterprises, ranged in order of income, were hogs and pigs, cattle and calves, dairy and milk, and poultry and other livestock (14).

## Industry and Transportation

Allen County has a well developed land-based transportation system that serves as corridors for transportation of industrial and agricultural products. Eleven State routes—Ohio Highways 12, 65, 66, 81, 115, 117, 196, 198, 309, 501, and 696—serve the Lima and Allen County area. In addition, U.S. Route 30 and Interstate 75 are major four-lane thoroughfares that provide access to nearby cities, such as Toledo, Ohio, and Fort Wayne, Indiana. Access to rail service is provided by Conrail, Grand Trunk Western, Norfolk and Southern, and Chessie System (CSX). The Lima Municipal Airport provides regional air service.

## Climate

Allen County is cold in winter and hot in summer. Winter precipitation, frequently in the form of snow, results in a good accumulation of soil moisture by the spring and minimizes drought during the summer. Normal annual precipitation patterns are adequate for all of the crops that are adapted to the temperatures and the growing season in the survey area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Lima, Ohio, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 27.9 degrees F and the average daily minimum temperature is 19.9 degrees. The lowest temperature on record, which occurred at Lima on January 19, 1994, is -21 degrees. In summer, the average temperature is 72.0 degrees and the average daily maximum temperature is 83.0 degrees. The highest recorded temperature, which occurred on July 15, 1936, is 109 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average total annual precipitation is 35.98 inches. Of this, 19.94 inches, or about 55.4 percent, usually falls in May through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.38 inches, recorded on June 14, 1981. Thunderstorms occur on about 39 days each year, and most occur between April and September.

The average seasonal snowfall is 19.2 inches. The greatest snow depth at any one time during the period of record was 19 inches. On the average, 40 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year. The heaviest 1-day snowfall on record was more than 18.0 inches, recorded on January 13, 1964.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines 74 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the west-southwest. Average windspeed is highest, 12 miles per hour, from January through April.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

## **Soil Survey Procedures**

Allen County was one of the first counties in northwestern Ohio to have a soil survey modernization. The general procedures followed in making this survey are described in the "National Soil Survey Handbook" (24) and the "Soil Survey Manual" (29) of the Natural Resources Conservation Service. The previous soil survey of Allen County (21) and U.S. Geological Survey topographic quadrangles were among the references used.

Prior to the soil survey modernization, a soil survey review team conducted an evaluation of the 1965 soil survey at the request of the Allen County Commissioners and Allen Soil and Water Conservation District. A report of the evaluation was prepared and sent to the Soil Inventory Board for review. After reviewing the evaluation report, the Soil Inventory Board recommended a soil survey modernization program and outlined the work to be completed for the soil survey modernization.

Before fieldwork began, a detailed study of all existing laboratory data, soil survey reports, and research studies was conducted by the Allen County soil survey staff. U.S. Geological Survey topographic maps, at a scale of 1:24,000, were used to help the soil scientists relate land and image features.

Allen County includes a large number of soil series. The 1965 soil survey is a valuable historical document that was relied on extensively during the modernization process. Patterns of soils on the landscape are typically complex. Modern soil science survey procedures differ from those practiced in the earlier survey. Some soil series names used in the old report no longer apply to the soils that were mapped and correlated during this update. Soil scientists making the 1965 survey did not recognize all of the soil series that current soil scientists using modern taxonomy and



**Figure 2.—Typical soil patterns of the Indiana and Ohio Till Plain region. The light-colored areas are Blount and Glynwood soils, and the darker colored areas are Pewamo soils.**

classification recognized during this survey. In addition, soil observations and evaluations during the 1965 survey were made to depths of 60 inches or less. This modernization project routinely made observations and evaluations to depths of 80 inches or to bedrock, whichever was deepest.

Recent aerial photographs, photographs from earlier flights, the Geologic Map of Ohio (15), and the United States Geological Survey quadrangles were used in making the survey. The maps and soil descriptions in the earlier survey were used as references in the correlation of soil series and map units. The previous survey was also used to determine the areas of highest variability when planning mapping and transect intervals.

A reconnaissance was made by vehicle before the soil scientists traversed the surface on foot and examined the soils. As they traversed the surface, the soil scientists divided the landscape into segments based on the use and management of the soils. For example, a rise would be separated from a depression or a gently sloping knoll or backslope would be separated from a flat.

Soil map units were traversed at varying intervals depending on the complexity of the soil types and patterns in the area.

Sample map units from the 1965 survey were transected. Borings were made at selected intervals during the transect to determine the composition of soil types within the map units. Soil scientists compared existing map units with the soil types in the area to see if earlier unrecognized soils with significant interpretive differences should be identified and separated during the survey modernization. Map unit boundaries were determined on the basis of soil examinations, observations, and photo

interpretation (fig. 2). When necessary, map units were redelineated so that new series could be included and soil types previously recognized could be better differentiated. Some map units were enlarged to include units previously mapped as another soil type when the differences in soil properties were not significant enough to require an additional map unit delineation. A data location map denoting where traverses and observations were made is on file at the Northwestern Ohio Soil Survey Project Office in Findlay.

Representative pedon sites from the 1965 survey were located, and the soils at these sites were examined in order to determine if they would meet present-day interpretation needs. The classification of these pedons also was compared with modern soil taxonomy standards. If the pedon was found to differ significantly in characteristics, a new pedon site was located that had soil properties that were representative of observations made during the current soil survey.

Most soils were examined using hand augers and soil tubes. Field notes were taken during the evaluation process. Deeper samples were taken to document soil material to a depth of 80 inches or to bedrock, whichever was deeper. These samples were obtained by taking soil cores using a probe truck or using a hand auger with extensions. Pedons described as typical were studied and documented in dug pits. Samples for laboratory analysis were taken for some of the typical pedon sites and at other locations in the county to obtain chemical and physical analyses and to determine engineering properties. This information was used in the classification, correlation, and interpretation of specific soil types.

After completion of the fieldwork, map unit delineations were transferred by hand to another set of planimetrically correct photographs. Surface features were recorded from observation of the maps and the landscape.

Samples for chemical and physical analyses were taken from representative sites of several of the soils in the county. The chemical and physical analyses were made by the Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio. The results of the analyses are stored in a computerized data file at the laboratory. The analyses for engineering properties were made by the Ohio Department of Transportation, Division of Highways, Testing Laboratory, Columbus, Ohio. The laboratory procedures can be obtained on request from the respective laboratories. The results of the analyses can be obtained from the School of Natural Resources, Ohio State University; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the State Office, Natural Resources Conservation Service, Columbus, Ohio.



# General Soil Map Units

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The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Some soil boundaries and soil names in this survey area do not fully match those in adjacent survey areas that were published at an earlier date. Differences are the result of changes and refinements in soil series concepts, updated soil taxonomy, slightly different map unit composition in survey areas, and the use of the State Soil Geographic data (STATSGO) map as the base for the general soil map in this publication.

## 1. Blount-Pewamo

*Very deep, level to gently sloping, somewhat poorly drained and very poorly drained soils that formed in till*

### **Setting**

*Landform:* Flats, rises, knolls, drainageways, and depressions on ground moraines

*Slope range:* 0 to 4 percent

### **Composition**

*Extent of the map unit in the county:* 53 percent

*Extent of the components in the map unit:*

Blount soils and similar soils—53 percent

Pewamo soils and similar soils—30 percent

Minor soils (including Glynwood, Houcktown, and Sloan)—17 percent

### **Soil Properties and Qualities**

#### **Blount**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Landform:* Flats, rises, and knolls

*Position on the landform:* Summits, shoulders, and backslopes

*Parent material:* Till

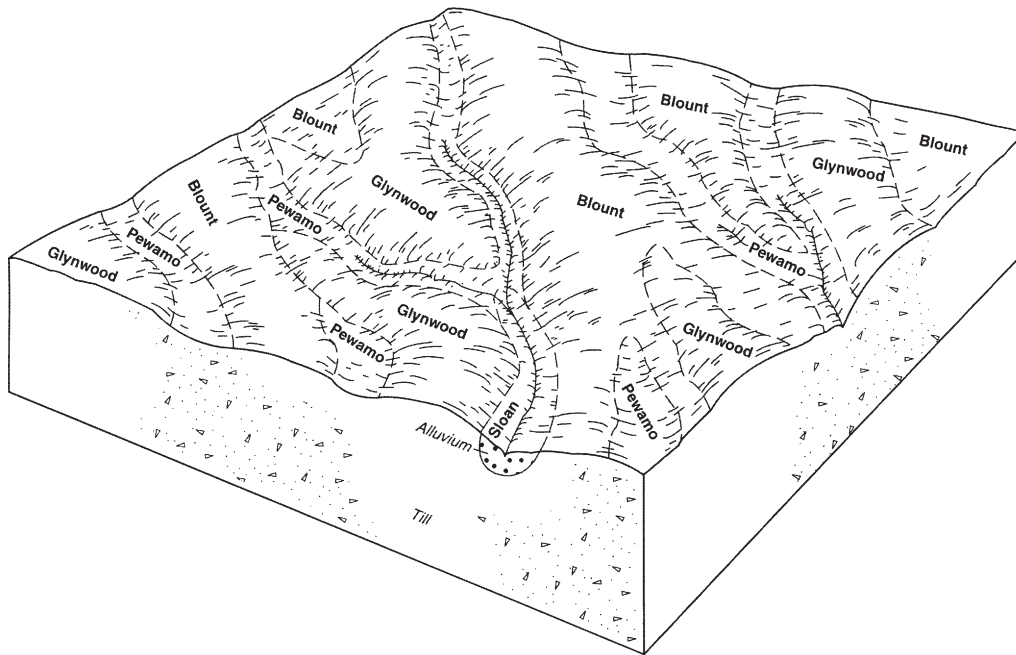


Figure 3.—Typical pattern of soils and parent material in the Blount-Glynwood-Pewamo general soil map unit.

*Surface textural class:* Silt loam or loam

*Slope range:* 0 to 4 percent

#### **Pewamo**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Landform:* Depressions and drainageways

*Parent material:* Till

*Surface textural class:* Silty clay loam

*Slope range:* 0 to 2 percent

#### **Use and Management**

*Major uses:* Cropland, pasture, and woodland

*Management concerns:* Seasonal wetness, erosion, tilth, compaction, and ponding

## **2. Blount-Glynwood-Pewamo**

*Very deep, level to strongly sloping, somewhat poorly drained, moderately well drained, and very poorly drained soils that formed in till (fig. 3)*

#### **Setting**

*Landform:* Flats, rises, knolls, depressions, and drainageways on end moraines and dissected areas on ground moraines

*Slope range:* 0 to 12 percent

#### **Composition**

*Extent of the map unit in the county:* 28 percent

*Extent of the components in the map unit:*

Blount soils and similar soils—42 percent

Glynwood soils and similar soils—30 percent  
 Pewamo soils and similar soils—17 percent  
 Minor soils (including Knoxdale, Lybrand, Shoals, and Sloan)—11 percent

### ***Soil Properties and Qualities***

#### **Blount**

*Depth class:* Very deep  
*Drainage class:* Somewhat poorly drained  
*Landform:* Flats, rises, and knolls  
*Position on the landform:* Summits, shoulders, and backslopes  
*Parent material:* Till  
*Surface textural class:* Silt loam or loam  
*Slope range:* 0 to 4 percent

#### **Glynwood**

*Depth class:* Very deep  
*Drainage class:* Moderately well drained  
*Landform:* Rises, knolls, and dissected areas  
*Position on the landform:* Backslopes, shoulders, and summits  
*Parent material:* Till  
*Surface textural class:* Silt loam, loam, clay loam, or silty clay loam  
*Slope range:* 0 to 12 percent

#### **Pewamo**

*Depth class:* Very deep  
*Drainage class:* Very poorly drained  
*Landform:* Depressions and drainageways  
*Parent material:* Till  
*Surface textural class:* Silty clay loam  
*Slope range:* 0 to 2 percent

### ***Use and Management***

*Major uses:* Cropland, pasture, woodland, and urban land  
*Management concerns:* Erosion, seasonal wetness, tilth, compaction, and ponding

## **3. Pewamo-Blount**

*Very deep, level to gently sloping, very poorly drained and somewhat poorly drained soils that formed in till*

### ***Setting***

*Landform:* Flats, rises, knolls, depressions, and drainageways on ground moraines  
*Slope range:* 0 to 4 percent

### ***Composition***

*Extent of the map unit in the county:* 10 percent  
*Extent of the components in the map unit:*  
     Pewamo soils and similar soils—60 percent  
     Blount soils and similar soils—31 percent  
     Minor soils (including Cygnet and Saranac)—9 percent

### ***Soil Properties and Qualities***

#### **Pewamo**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Landform:* Depressions and drainageways

*Parent material:* Till

*Surface textural class:* Silty clay loam

*Slope range:* 0 to 1 percent

#### **Blount**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Landform:* Flats, rises, and knolls

*Position on the landform:* Summits, shoulders, and backslopes

*Parent material:* Till

*Surface textural class:* Silt loam or loam

*Slope range:* 0 to 4 percent

### ***Use and Management***

*Major uses:* Cropland, pasture, and woodland

*Management concerns:* Seasonal wetness, erosion, tilth, compaction, and ponding

## **4. Cygnet-Rensselaer-Alvada**

*Very deep, level and nearly level, moderately well drained and very poorly drained soils that formed in loamy deposits and the underlying till, loamy deposits, or loamy and gravelly deposits over till*

### ***Setting***

*Landform:* Rises, flats, depressions, and drainageways on glacial deltas on lake plains

*Slope range:* 0 to 3 percent

### ***Composition***

*Extent of the map unit in the county:* 1 percent

*Extent of the components in the map unit:*

Cygnet soils and similar soils—37 percent

Rensselaer soils—25 percent

Alvada soils and similar soils—23 percent

Minor soils (including Arkport, Aurand, Houcktown, Medway, and Shawtown)—15 percent

### ***Soil Properties and Qualities***

#### **Cygnet**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Landform:* Rises

*Position on the landform:* Summits and shoulders

*Parent material:* Loamy deposits and the underlying till

*Surface textural class:* Loam

*Slope range:* 0 to 3 percent

**Rensselaer***Depth class:* Very deep*Drainage class:* Very poorly drained*Landform:* Flats, depressions, and drainageways*Parent material:* Generally loamy deposits; in the till substratum phase, loamy deposits overlying till*Surface textural class:* Loam or silt loam*Slope range:* 0 to 1 percent**Alvada***Depth class:* Very deep*Drainage class:* Very poorly drained*Landform:* Flats, depressions, and drainageways*Parent material:* Loamy and gravelly deposits overlying till*Surface textural class:* Loam or silty clay loam*Slope range:* 0 to 1 percent***Use and Management****Major uses:* Cropland and woodland*Management concerns:* Seasonal wetness, tilth, compaction, and ponding**5. Rensselaer-Cygnets-Gallman***Very deep, level to strongly sloping, very poorly drained, moderately well drained, and well drained soils that formed in loamy deposits, loamy deposits and the underlying till, or poorly sorted outwash****Setting****Landform:* Flats, depressions, drainageways, rises, and knolls on glacial drainage channels*Slope range:* 0 to 12 percent***Composition****Extent of the map unit in the county:* 1 percent*Extent of the components in the map unit:*

Rensselaer soils and similar soils—32 percent

Cygnets soils and similar soils—28 percent

Gallman soils and similar soils—26 percent

Minor soils (including Arkport, Fox, Houcktown, Shawtown, and Sloan)—14 percent

***Soil Properties and Qualities*****Rensselaer***Depth class:* Very deep*Drainage class:* Very poorly drained*Landform:* Flats, depressions, and drainageways*Parent material:* Generally loamy deposits; in the till substratum phase, loamy deposits overlying till*Surface textural class:* Loam or silt loam*Slope range:* 0 to 1 percent

**Cygnnet**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Landform:* Rises

*Position on the landform:* Summits and shoulders

*Parent material:* Loamy deposits and the underlying till

*Surface textural class:* Loam

*Slope range:* 0 to 3 percent

**Gallman**

*Depth class:* Very deep

*Drainage class:* Well drained

*Landform:* Rises and knolls

*Position on the landform:* Backslopes, shoulders, and summits

*Parent material:* Poorly sorted outwash

*Surface textural class:* Loam or silt loam

*Slope range:* 0 to 12 percent

***Use and Management***

*Major uses:* Cropland, pasture, and woodland

*Management concerns:* Seasonal wetness, erosion, compaction, and ponding

**6. Hoytville-Shawtown**

*Very deep, level to gently sloping, very poorly drained and moderately well drained soils that formed in till or in stratified, water-sorted deposits overlying till*

***Setting***

*Landform:* Flats, depressions, and drainageways on lake plains and knolls on beach ridges on lake plains

*Slope range:* 0 to 6 percent

***Composition***

*Extent of the map unit in the county:* 5 percent

*Extent of the components in the map unit:*

Hoytville soils and similar soils—65 percent

Shawtown soils and similar soils—15 percent

Minor soils (including Aurand, Cygnet, Houcktown, Knoxdale, Nappanee, and Sloan)—20 percent

***Soil Properties and Qualities*****Hoytville**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Landform:* Flats, depressions, and drainageways

*Parent material:* Till

*Surface textural class:* Silty clay loam

*Slope range:* 0 to 1 percent

**Shawtown**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Landform:* Knolls

*Position on the landform:* Backslopes, shoulders, and summits

*Parent material:* Stratified, water-sorted deposits overlying till

*Surface textural class:* Loam

*Slope range:* 2 to 6 percent

### ***Use and Management***

*Major uses:* Cropland

*Management concerns:* Seasonal wetness, ponding, high clay content in the subsoil, erosion, compaction, and tilth

## **7. Westland-Gallman-Thackery**

*Very deep, level to strongly sloping, very poorly drained, well drained, and moderately well drained soils that formed in loamy deposits and the underlying outwash or in outwash*

### ***Setting***

*Landform:* Depressions, drainageways, knolls, flats, and rises on outwash plains

*Slope range:* 0 to 12 percent

### ***Composition***

*Extent of the map unit in the county:* 2 percent

*Extent of the components in the map unit:*

Westland soils and similar soils—35 percent

Gallman soils and similar soils—21 percent

Thackery soils and similar soils—16 percent

Minor soils (including Houcktown, Knoxdale, Medway, Rensselaer, Saranac, and Sloan)—28 percent

### ***Soil Properties and Qualities***

#### **Westland**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Landform:* Flats, depressions, and drainageways

*Parent material:* Loamy deposits and the underlying sandy and gravelly outwash

*Surface textural class:* Clay loam or loam

*Slope range:* 0 to 1 percent

#### **Gallman**

*Depth class:* Very deep

*Drainage class:* Well drained

*Landform:* Rises and knolls

*Position on the landform:* Backslopes, shoulders, and summits

*Parent material:* Poorly sorted outwash

*Surface textural class:* Loam or silt loam

*Slope range:* 0 to 12 percent

#### **Thackery**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Landform:* Flats, rises, and knolls

*Position on the landform:* Summits, shoulders, and backslopes

*Parent material:* Outwash

*Surface textural class:* Loam or sandy loam

*Slope range:* 0 to 3 percent

### ***Use and Management***

*Major uses:* Cropland and woodland

*Management concerns:* Seasonal wetness, ponding, erosion, tilth, and compaction

## Detailed Soil Map Units

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The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

The detailed map unit descriptions list management statements for most major uses of the soils, including cropland, pasture, woodland, building sites, septic tank absorption fields, and local roads and streets. The management statements listed for a particular map unit address the most limiting features of that soil for a certain use. Some management statements suggest specific measures that may help alleviate the effects of these limiting soil features. The mention of such management measures is not a recommendation, especially where current laws or programs may prohibit an activity, such as installation of drainage. Even the best management practices cannot overcome some soil limitations.

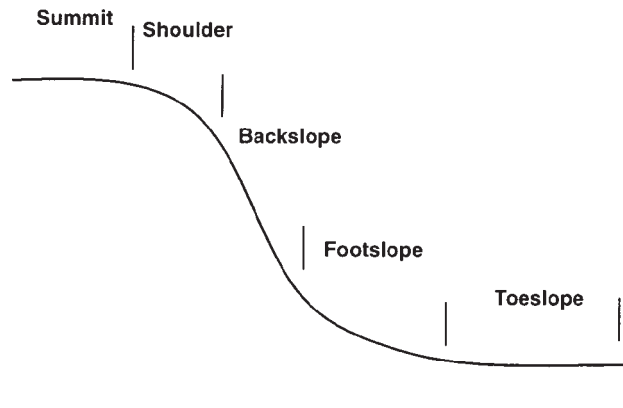


Figure 4.—Diagram showing the relationship between slope position and slope terminology. Adapted from Ruhe, 1975 (18).

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Blount silt loam, 0 to 2 percent slopes, is a phase of the Blount series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Westland-Rensselaer complex, 0 to 1 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarry, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give more detailed properties of the soils, such as permeability of each layer, and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Figure 4 shows the relationship between different geomorphic slope positions and slope terminology. In areas of low relief in Allen County, these terms generally are not used. Refer to the Glossary for more detailed definitions of these landform components.

## AkA—Alvada loam, 0 to 1 percent slopes

### Setting

*Landform:* Flats, depressions, and drainageways on lake plains, deltas on lake plains, outwash plains, and ground moraines

*Size of areas:* 2 to 70 acres

### ***Map Unit Composition***

Alvada soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 8.6 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 13 to 32 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Perched

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 8.0 percent

*Parent material:* Loamy and gravelly deposits overlying till

*Permeability:* Moderate in the subsoil and moderately slow or slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have till at a depth of 20 to 40 inches
- Soils that are underlain with lacustrine silts
- Soils that have a clay loam surface layer
- Soils that have a surface layer less than 10 inches thick
- Soils that have a silt loam surface layer
- Soils that have loam till

#### *Dissimilar:*

- Somewhat poorly drained soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.

- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

#### **Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

### **AmA—Alvada silty clay loam, 0 to 1 percent slopes**

#### ***Setting***

*Landform:* Flats, depressions, and drainageways on lake plains, deltas on lake plains, and ground moraines

*Size of areas:* 2 to 35 acres

#### ***Map Unit Composition***

Alvada soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 8.1 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 16 to 37 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Perched

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 8.0 percent

*Parent material:* Loamy and gravelly deposits overlying till

*Permeability:* Moderate in the subsoil and moderately slow or slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### ***Similar:***

- Soils that have till at a depth of 20 to 40 inches
- Soils that have a surface layer less than 10 inches thick
- Soils that have loam till

#### ***Dissimilar:***

- Somewhat poorly drained soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. This soil is generally unsuited to building site development.

**Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

**ArB—Arkport loamy fine sand, 2 to 6 percent slopes*****Setting***

*Landform:* Dunes on deltas on lake plains and beach ridges on lake plains

*Position on the landform:* Backslopes, shoulders, and summits

*Size of areas:* 2 to 20 acres

***Map Unit Composition***

Arkport soil and similar components: 100 percent

***Soil Properties and Qualities***

*Available water capacity:* About 5.6 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 3 to 13 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Sandy eolian deposits

*Permeability:* Moderately rapid

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Loamy fine sand

*Potential for surface runoff:* Very low

*Wind erosion hazard:* Severe

***Additional Components***

Similar:

- Soils that do not have layers of fine sandy loam in the subsoil
- Moderately well drained soils
- Soils that have more rock fragments in the substratum

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- An episode of fire may reduce soil productivity.

#### **Building sites**

- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.
- This soil is well suited to use as building sites.

#### **Septic tank absorption fields**

- This soil is well suited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* B-1

*Hydric soil:* No

## **AuA—Aurand loam, 0 to 3 percent slopes**

### ***Setting***

*Landform:* Flats on lake plains, beach ridges, and rises on ground moraines

*Position on the landform:* Footslopes, summits, and shoulders

*Size of areas:* 2 to 30 acres

### ***Map Unit Composition***

Aurand soil and similar components: 85 percent

Dissimilar components: 15 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.1 inches to a depth of 44 inches

*Cation-exchange capacity of the surface layer:* 8 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 6.0 percent

*Parent material:* Loamy glaciolacustrine deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam or sandy loam surface layer
- Soils that have a surface layer less than 10 inches thick
- Soils that have till at a depth of 40 to 60 inches
- Moderately well drained soils

*Dissimilar:*

- Alvada soils in depressions (8 percent of map unit)
- Loamy, very poorly drained soils that have till at a depth of 20 to 40 inches, in depressions (5 percent of map unit)
- Hoytville soils in drainageways and depressions at the margins of map units (1 percent of map unit)
- Shawtown soils in the more sloping areas (1 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* No

### **AxA—Aurand silt loam, 0 to 3 percent slopes**

#### ***Setting***

*Landform:* Flats on lake plains, beach ridges, and rises on ground moraines

*Position on the landform:* Summits, footslopes, and shoulders

*Size of areas:* 2 to 20 acres

#### ***Map Unit Composition***

Aurand soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 6.6 inches to a depth of 46 inches

*Cation-exchange capacity of the surface layer:* 13 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 6.0 percent

*Parent material:* Loamy glaciolacustrine deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Moderately well drained soils
- Soils that have till at a depth of 40 to 60 inches
- Soils that have a loam surface layer

*Dissimilar:*

- Shawtown soils in the more sloping areas (4 percent of map unit)
- Alvada soils in depressions (3 percent of map unit)
- Loamy, very poorly drained soils that have till at a depth of 20 to 40 inches, in depressions (3 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and

building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.

- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* No

### **BoA—Blount silt loam, 0 to 2 percent slopes**

#### ***Setting***

*Landform:* Rises and flats on ground moraines and end moraines

*Position on the landform:* Shoulders and summits

*Size of areas:* 2 to 300 acres

#### ***Map Unit Composition***

Blount soil and similar components: 95 percent

Dissimilar components: 5 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 7.6 inches to a depth of 55 inches

*Cation-exchange capacity of the surface layer:* 13 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 30 to 60 inches

*Depth to the top of the seasonal high water table:* 0.5 to 1.0 foot

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 4.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam



**Figure 5.—The installation of subsurface drainage systems helps lower the seasonal high water table in areas of Blount silt loam, 0 to 2 percent slopes.**

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a loam surface layer
- Soils that have slopes of 2 to 4 percent

*Dissimilar:*

- Pewamo soils in depressions and drainageways

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table (fig. 5).
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification: 2w*

*Prime farmland: Prime farmland if drained*

*Pasture and hayland suitability group: C-1*

*Hydric soil: No*

## **BoB—Blount silt loam, 2 to 4 percent slopes**

### ***Setting***

*Landform:* Knolls on ground moraines and end moraines

*Position on the landform:* Summits, backslopes, and shoulders

*Size of areas:* 2 to 500 acres

### ***Map Unit Composition***

Blount soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.9 inches to a depth of 45 inches

*Cation-exchange capacity of the surface layer:* 13 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 30 to 60 inches

*Depth to the top of the seasonal high water table:* 0.5 to 1.0 foot

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 4.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have slopes of 0 to 2 percent

*Dissimilar:*

- Pewamo soils in drainageways

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

**Pastureland**

- Erosion control is needed when pastures are renovated.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification: 2e*

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* No

## **BrA—Blount-Jenera complex, 0 to 3 percent slopes**

### ***Setting***

*Landform:* Rises on ground moraines

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 20 acres

### ***Map Unit Composition***

Blount soil and similar components: 55 percent

Jenera soil and similar components: 40 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* Blount—about 7.6 inches to a depth of 52 inches; Jenera—about 6.8 inches to a depth of 44 inches

*Cation-exchange capacity of the surface layer:* Blount—13 to 22 meq per 100 grams; Jenera—6 to 18 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Blount—dense material is at a depth of 30 to 60 inches; Jenera—dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* Blount—0.5 to 1.0 foot; Jenera—1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Blount—somewhat poorly drained; Jenera—moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* Blount—2.0 to 4.0 percent; Jenera—1.0 to 3.0 percent

*Parent material:* Blount—till; Jenera—stratified loamy and silty glaciolacustrine deposits and the underlying till

*Permeability:* Blount—slow in the subsoil and slow or very slow in the substratum; Jenera—moderate in the upper part of the subsoil, slow or moderately slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Blount—loam; Jenera—fine sandy loam

*Potential for surface runoff:* Blount—high; Jenera—low

*Wind erosion hazard:* Blount—slight; Jenera—moderate

### ***Additional Components***

*Similar:*

- Loamy, somewhat poorly drained soils
- Blount soils that have a silt loam surface layer

*Dissimilar:*

- Pewamo soils in drainageways and depressions

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The rooting depth of crops may be restricted by the high clay content in areas of the Blount soil.
- Subsurface drainage helps to lower the seasonal high water table.
- In areas of the Blount soil, including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.
- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.
- Systematic subsurface drainage extends the period of planting and harvesting crops in areas of the Jenera soil.

#### **Pastureland**

- In areas of the Blount soil, excess water should be removed or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- In areas of the Blount soil, the seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased in areas of the Blount soil.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment in areas of the Blount soil may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the Blount soil reduces the efficiency of mechanical planting equipment.

#### **Building sites**

- Because of a seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. These soils are poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the Blount soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- A seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, these soils may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* Blount—C-1; Jenera—A-6

*Hydric soils:* No

**BsA—Blount-Urban land complex, 0 to 2 percent slopes*****Setting***

*Landform:* Rises on ground moraines and end moraines

*Position on the landform:* Summits and shoulders

*Size of areas:* 5 to 200 acres

***Map Unit Composition***

Blount soil and similar components: 50 percent

Urban land and similar components: 40 percent

Dissimilar components: 10 percent

***Properties and Qualities of the Blount Soil***

*Available water capacity:* About 7.8 inches to a depth of 51 inches

*Cation-exchange capacity of the surface layer:* 13 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 30 to 60 inches

*Depth to the top of the seasonal high water table:* 0.5 to 1.0 foot

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 4.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have slopes of 2 to 4 percent
- Soils that have a loam surface layer
- Moderately well drained soils

*Dissimilar:*

- Pewamo soils in drainageways and depressions (5 percent of map unit)
- Udorthents near buildings and roads (5 percent of map unit)

***Use and Management Considerations*****Building sites**

- Because of the seasonal high water table of the Blount soil, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the Blount soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas of the Blount soil, the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

**Septic tank absorption fields**

- In areas of the Blount soil, the restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- In areas of the Blount soil, the seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

**Local roads and streets**

- Because of shrinking and swelling, the Blount soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- In areas of the Blount soil, the seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, the Blount soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soils:* Blount—no; Urban land—unranked

**CyA—Cygnets loam, 0 to 3 percent slopes*****Setting***

*Landform:* Beach ridges on lake plains, rises on deltas on lake plains, glacial drainage channels, and rises on ground moraines

*Position on the landform:* Shoulders and summits

*Size of areas:* 2 to 50 acres

### **Map Unit Composition**

Cygnnet soil and similar components: 90 percent

Dissimilar components: 10 percent

### **Soil Properties and Qualities**

*Available water capacity:* About 8.4 inches to a depth of 50 inches

*Cation-exchange capacity of the surface layer:* 7 to 18 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### **Additional Components**

*Similar:*

- Moderately well drained soils that have till at a depth of 20 to 40 inches
- Moderately well drained soils that have till at a depth of 60 to 70 inches
- Somewhat poorly drained soils

*Dissimilar:*

- Alvada soils in depressions and at the margins of map units

### **Use and Management Considerations**

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Systematic subsurface drainage extends the period of planting and harvesting crops.

#### **Pastureland**

- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

**DaA—Darroch loam, 0 to 2 percent slopes*****Setting***

*Landform:* Flats and rises on lake plains

*Position on the landform:* Summits

*Size of areas:* 2 to 30 acres

***Map Unit Composition***

Darroch soil and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*Available water capacity:* About 9.8 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 9 to 24 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 4.0 percent

*Parent material:* Stratified loamy and silty glaciolacustrine deposits

*Permeability:* Moderate

*Potential for frost action:* High  
*Shrink-swell potential:* Low  
*Surface layer texture:* Loam  
*Potential for surface runoff:* Low  
*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have till at a depth of 40 to 80 inches
- Soils that have more silt and less sand in the subsoil
- Soils that have a surface layer less than 10 inches thick
- Moderately well drained soils

#### *Dissimilar:*

- Rensselaer soils in drainageways and depressions

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* No

**EmB—Eldean silt loam, 1 to 4 percent slopes*****Setting***

*Landform:* Rises and knolls on ground moraines and stream terraces

*Position on the landform:* Summits, shoulders, backslopes, risers, and treads

*Size of areas:* 2 to 30 acres

***Map Unit Composition***

Eldean soil and similar components: 95 percent

Dissimilar components: 5 percent

***Soil Properties and Qualities***

*Available water capacity:* About 4.8 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 8 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Outwash

*Permeability:* Moderate or moderately slow in the subsoil and rapid or very rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have less clay in the subsoil
- Soils that have a loam surface layer
- Soils that have a thinner subsoil
- Soils that have more silt and clay in the substratum
- Soils that have a darker surface layer

*Dissimilar:*

- Somewhat poorly drained soils in depressions and drainageways

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

#### **Building sites**

- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.
- This soil is well suited to use as building sites.

#### **Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* B-1

*Hydric soil:* No

## **FdA—Flatrock silt loam, limestone substratum, 0 to 2 percent slopes, occasionally flooded**

### ***Setting***

*Landform:* Flats, rises, and natural levees on flood plains

*Size of areas:* 2 to 50 acres

### ***Map Unit Composition***

Flatrock soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.8 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 9 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Bedrock (lithic) is at a depth of 60 to 80 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* Occasional

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy alluvium overlying limestone or dolostone

*Permeability:* Moderate in the subsoil and moderate or moderately rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a darker surface layer
- Soils that have a loam surface layer
- Somewhat poorly drained soils
- Soils that have bedrock at a depth of 40 to 60 inches
- Well drained soils
- Soils that have more clay in the surface layer and subsoil

*Dissimilar:*

- Sloan soils in backswamps

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

#### **Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-5

*Hydric soil:* No

## **FnB—Fox loam, 2 to 6 percent slopes**

### ***Setting***

*Landform:* Knolls on glacial drainage channels and stream terraces

*Position on the landform:* Shoulders, backslopes, summits, and risers

*Size of areas:* 2 to 20 acres

### ***Map Unit Composition***

Fox soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.4 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 6 to 16 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy deposits overlying stratified sandy and gravelly outwash

*Permeability:* Moderate in the subsoil and moderate or moderately rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have more silt and clay in the substratum
- Soils that have till at a depth of 60 to 80 inches
- Soils that have slopes of 0 to 2 percent
- Soils that have more clay in the surface layer and subsoil
- Soils that have a darker surface layer

*Dissimilar:*

- Glynwood soils at the margins of map units (5 percent of map unit)
- Houcktown soils at the margins of map units (5 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.

### **Pastureland**

- Erosion control is needed when pastures are renovated.

### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

### **Building sites**

- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.
- This soil is well suited to use as building sites.

### **Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.

### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

## **FnD2—Fox loam, 12 to 18 percent slopes, eroded**

### ***Setting***

*Landform:* Outwash plains

*Position on the landform:* Backslopes and shoulders

*Size of areas:* 2 to 5 acres

### ***Map Unit Composition***

Fox soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 5.4 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 5 to 14 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Loamy deposits over stratified sandy and gravelly outwash

*Permeability:* Moderate in the subsoil and rapid or very rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have slopes of 6 to 12 percent
- Soils that have a seasonal high water table at a depth of 4 to 6 feet
- Soils that have more silt and clay in the substratum

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer, and the remaining surface layer is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

#### **Woodland**

- If the soil is disturbed, the slope increases the hazard of erosion.
- The slope increases excavation costs, poses safety hazards, and creates a potential for erosion during the construction of haul roads and log landings.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.

- The sandy layers in this soil increase the maintenance of haul roads and log landings.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- The slope restricts the use of equipment for preparing sites for planting and seeding.
- Burning may destroy organic matter.

#### **Building sites**

- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

#### **Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

#### ***Interpretive Groups***

*Land capability classification:* 4e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* B-1

*Hydric soil:* No

### **FoA—Fox silt loam, 0 to 2 percent slopes**

#### ***Setting***

*Landform:* Rises on glacial drainage channels

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 10 acres

#### ***Map Unit Composition***

Fox soil and similar components: 100 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 6.2 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 8 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy deposits over stratified sandy and gravelly outwash

*Permeability:* Moderate in the subsoil and rapid or very rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a thinner subsoil
- Soils that have slopes of 2 to 6 percent
- Soils that have a loam surface layer
- Soils that have more silt and clay in the substratum

### ***Use and Management Considerations***

#### **Cropland**

- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

#### **Pastureland**

- This soil is well suited to pasture.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- Rock fragments obstruct the use of mechanical planting equipment.

#### **Building sites**

- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.
- This soil is well suited to use as building sites.

#### **Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent

from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.

- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 2s

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

### **FpC2—Fox-Lybrand complex, 6 to 12 percent slopes, eroded**

#### ***Setting***

*Landform:* Stream terraces, glacial drainage channels, and knolls on end moraines

*Position on the landform:* Backslopes, shoulders, and risers

*Size of areas:* 2 to 10 acres

#### ***Map Unit Composition***

Fox soil and similar components: 50 percent

Lybrand soil and similar components: 40 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* Fox—about 4.4 inches to a depth of 60 inches; Lybrand—about 8.0 inches to a depth of 56 inches

*Cation-exchange capacity of the surface layer:* Fox—5 to 14 meq per 100 grams; Lybrand—11 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Fox—more than 80 inches; Lybrand—dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* Fox—more than 6 feet; Lybrand—3.3 to 5.0 feet

*Kind of water table:* Fox—not applicable; Lybrand—perched

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Fox—loamy deposits over stratified sandy and gravelly outwash; Lybrand—till

*Permeability:* Fox—moderate in the subsoil and rapid or very rapid in the substratum; Lybrand—slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Fox—low; Lybrand—moderate

*Surface layer texture:* Fox—loam; Lybrand—silty clay loam

*Potential for surface runoff:* Fox—medium; Lybrand—very high

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Moderately well drained soils
- Loamy soils that have a subsoil 40 to 60 inches thick
- Soils that have more silt and clay in the gravelly substratum

*Dissimilar:*

- Severely eroded areas in similar landform positions

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer of these soils, and the remaining surface layer is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the Fox soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- In areas of the Fox soil, the careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Clods may form in areas of the Lybrand soil if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction in areas of the Lybrand soil.
- In areas of the Lybrand soil, the rooting depth of crops may be restricted by the high clay content.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- In areas of the Fox soil, plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- The Fox soil provides poor summer pasture.

#### **Woodland**

- The low strength of these soils may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low strength of these soils, the cost of constructing haul roads and log landings is increased.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low strength of these soils, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- Burning may destroy organic matter.
- The stickiness of the Lybrand soil reduces the efficiency of mechanical planting equipment.

### **Building sites**

- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- In areas of the Fox soil, because of the high content of sand or gravel, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.
- The moderate shrinking and swelling of the Lybrand soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In areas of the Lybrand soil, because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. Special design of structures is needed to prevent damage caused by wetness.
- In some areas of the Lybrand soil, the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

### **Septic tank absorption fields**

- In areas of the Fox soil, the excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- In areas of the Lybrand soil, the seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.
- Because of shrinking and swelling, the Lybrand soil may not be suitable for use as base material for local roads and streets.
- Because of the low bearing strength, the Lybrand soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

### ***Interpretive Groups***

*Land capability classification:* 3e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Fox—B-1; Lybrand—A-1

*Hydric soils:* No

## **GaA—Gallman loam, 0 to 2 percent slopes**

### ***Setting***

*Landform:* Rises on outwash plains and glacial drainage channels

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 20 acres

### ***Map Unit Composition***

Gallman soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 8.1 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 6 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Poorly sorted outwash

*Permeability:* Moderately rapid in the subsoil and moderately rapid or rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam or sandy loam surface layer
- Soils that have fewer rock fragments in the subsoil
- Moderately well drained soils
- Soils that have a seasonal high water table at a depth of 4 to 6 feet

### ***Use and Management Considerations***

#### **Cropland**

- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.

#### **Pastureland**

- This soil is well suited to pasture.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- This soil is well suited to use as building sites.

#### **Septic tank absorption fields**

- This soil is well suited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

**GaB—Gallman loam, 2 to 6 percent slopes*****Setting***

*Landform:* Knolls on outwash plains and glacial drainage channels

*Position on the landform:* Summits, shoulders, and backslopes

*Size of areas:* 2 to 45 acres

***Map Unit Composition***

Gallman soil and similar components: 100 percent

***Soil Properties and Qualities***

*Available water capacity:* About 8.2 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 6 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Poorly sorted outwash

*Permeability:* Moderately rapid in the subsoil and moderately rapid or rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have a sandy loam or silt loam surface layer
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a darker surface layer
- Soils that have fewer rock fragments in the subsoil
- Soils that have slopes of 0 to 2 percent
- Moderately well drained soils
- Soils that have a seasonal high water table at a depth of 4 to 6 feet
- Soils that have a thinner subsoil

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- This soil is well suited to use as building sites.

#### **Septic tank absorption fields**

- This soil is well suited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

## **GaC—Gallman loam, 6 to 12 percent slopes**

### ***Setting***

*Landform:* Knolls on outwash plains and glacial drainage channels

*Position on the landform:* Backslopes and shoulders

*Size of areas:* 2 to 10 acres

### ***Map Unit Composition***

Gallman soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 8.1 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 6 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* More than 6 feet

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Poorly sorted outwash

*Permeability:* Moderately rapid in the subsoil and moderately rapid or rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have till at a depth of 60 to 80 inches
- Soils that have a sandy loam or silt loam surface layer
- Soils that have fewer rock fragments in the subsoil
- Soils that have a seasonal high water table at a depth of 4 to 6 feet

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.

#### **Building sites**

- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.

#### **Septic tank absorption fields**

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

***Interpretive Groups***

*Land capability classification:* 3e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

**GbA—Gallman silt loam, 0 to 2 percent slopes*****Setting***

*Landform:* Rises on outwash plains and glacial drainage channels

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 20 acres

***Map Unit Composition***

Gallman soil and similar components: 100 percent

***Soil Properties and Qualities***

*Available water capacity:* About 8.3 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 9 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 4.0 to 6.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Poorly sorted outwash

*Permeability:* Moderately rapid in the subsoil and moderately rapid or rapid in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have a loam surface layer
- Moderately well drained soils
- Soils that have fewer rock fragments in the subsoil

***Use and Management Considerations*****Cropland**

- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.

#### **Pastureland**

- This soil is well suited to pasture.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. Special design of structures is needed to prevent damage caused by wetness.
- This soil is well suited to use as building sites.

#### **Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The seasonal high water table limits the absorption and proper treatment of effluent from septic systems.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

### ***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

## **GkA—Glynwood loam, 0 to 2 percent slopes**

### ***Setting***

*Landform:* Rises on ground moraines

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 15 acres

### ***Map Unit Composition***

Glynwood soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.5 inches to a depth of 41 inches

*Cation-exchange capacity of the surface layer:* 8 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam surface layer
- Somewhat poorly drained soils that have more sand and less clay in the subsoil
- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have a thicker subsoil
- Somewhat poorly drained soils

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The rooting depth of crops may be restricted by the high clay content.
- Systematic subsurface drainage extends the period of planting and harvesting crops.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and

basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.

- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

### **GkB—Glynwood loam, 2 to 4 percent slopes**

#### ***Setting***

*Landform:* Knolls on ground moraines and end moraines

*Position on the landform:* Shoulders, backslopes, and summits

*Size of areas:* 2 to 15 acres

#### ***Map Unit Composition***

Glynwood soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 6.8 inches to a depth of 44 inches

*Cation-exchange capacity of the surface layer:* 8 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High  
*Shrink-swell potential:* Moderate  
*Surface layer texture:* Loam  
*Potential for surface runoff:* High  
*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have a surface layer less than 5 inches thick
- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have a thicker subsoil
- Somewhat poorly drained soils

#### *Dissimilar:*

- Poorly drained and very poorly drained soils in the less sloping areas

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The root system of winter grain crops may be damaged by frost action.
- The rooting depth of crops may be restricted by the high clay content.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.

- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

### **GmC2—Glynwood clay loam, 6 to 12 percent slopes, eroded**

#### ***Setting***

*Landform:* Dissected areas on ground moraines and end moraines

*Position on the landform:* Backslopes and shoulders

*Size of areas:* 2 to 10 acres

#### ***Map Unit Composition***

Glynwood soil and similar components: 100 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 5.2 inches to a depth of 34 inches

*Cation-exchange capacity of the surface layer:* 12 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Clay loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have slopes of 2 to 6 percent
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Soils that have a thicker subsoil
- Somewhat poorly drained soils

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer, and the remaining surface layer is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The movement of water into subsurface drains is restricted. Drainage guides can be used to determine tile spacing requirements.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.

- Soil wetness may limit the use of log trucks.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- Burning may destroy organic matter.

### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

### ***Interpretive Groups***

*Land capability classification: 4e*

*Prime farmland: Not prime farmland*

*Pasture and hayland suitability group: A-6*

*Hydric soil: No*

## **GnB—Glynwood silt loam, 2 to 6 percent slopes**

### ***Setting***

*Landform:* Knolls and dissected areas on end moraines and ground moraines

*Position on the landform:* Backslopes, shoulders, and summits

*Size of areas:* 2 to 50 acres

### ***Map Unit Composition***

Glynwood soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 7.5 inches to a depth of 47 inches

*Cation-exchange capacity of the surface layer:* 8 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Eroded areas that have a surface layer of silty clay loam
- Soils that have a loam surface layer
- Soils that have more sand and less clay in the subsoil
- Somewhat poorly drained soils
- Soils that have slopes of 0 to 2 percent
- Soils that have a thicker subsoil

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil

structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

### **Pastureland**

- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.

### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

### ***Interpretive Groups***

*Land capability classification: 2e*

*Prime farmland: All areas are prime farmland*

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

## **GnC—Glynwood silt loam, 6 to 12 percent slopes**

### ***Setting***

*Landform:* Dissected areas on end moraines and ground moraines

*Position on the landform:* Backslopes and shoulders

*Size of areas:* 2 to 10 acres

### ***Map Unit Composition***

Glynwood soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 7.1 inches to a depth of 46 inches

*Cation-exchange capacity of the surface layer:* 8 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Very high

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have slopes of 2 to 6 percent
- Soils that have a loam surface layer
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Somewhat poorly drained loamy soils on slopes of 2 to 4 percent
- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have a thicker subsoil
- Somewhat poorly drained soils

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.

### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

### ***Interpretive Groups***

*Land capability classification:* 3e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

## **GrB2—Glynwood silty clay loam, 2 to 6 percent slopes, eroded**

### ***Setting***

*Landform:* Knolls on end moraines and ground moraines and dissected areas on ground moraines along streams

*Position on the landform:* Backslopes, shoulders, and summits

*Size of areas:* 2 to 35 acres

### ***Map Unit Composition***

Glynwood soil and similar components: 93 percent

Dissimilar components: 7 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.3 inches to a depth of 40 inches

*Cation-exchange capacity of the surface layer:* 12 to 27 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Uneroded areas that have a silt loam surface layer
- Soils that have more sand and less clay in the subsoil

*Dissimilar:*

- Severely eroded areas in similar landform positions

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer, and the remaining surface layer is less productive and more difficult to manage.
- The root system of winter grain crops may be damaged by frost action.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- Burning may destroy organic matter.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.

- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 3e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

### **GrC2—Glynwood silty clay loam, 6 to 12 percent slopes, eroded**

#### ***Setting***

*Landform:* Dissected areas on end moraine and ground moraines along streams and knolls on ground moraines

*Position on the landform:* Backslopes and shoulders

*Size of areas:* 2 to 20 acres

#### ***Map Unit Composition***

Glynwood soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 5.0 inches to a depth of 35 inches

*Cation-exchange capacity of the surface layer:* 12 to 27 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam  
*Potential for surface runoff:* Very high  
*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Soils that have slopes of 2 to 6 percent
- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have a thicker subsoil
- Soils that have an uneroded surface layer
- Somewhat poorly drained soils

#### *Dissimilar:*

- Severely eroded areas in similar landform positions

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer, and the remaining surface layer is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The movement of water into subsurface drains is restricted. Drainage guides can be used to determine tile spacing requirements.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.

- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- Burning may destroy organic matter.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

***Interpretive Groups***

*Land capability classification: 4e*

*Prime farmland: Not prime farmland*

*Pasture and hayland suitability group: A-6*

*Hydric soil: No*

## **GuB—Glynwood-Urban land complex, 2 to 6 percent slopes**

### ***Setting***

*Landform:* Knolls on ground moraines and end moraines

*Position on the landform:* Summits, shoulders, and backslopes

*Size of areas:* 5 to 300 acres

### ***Map Unit Composition***

Glynwood soil and similar components: 50 percent

Urban land and similar components: 45 percent

Dissimilar components: 5 percent

### ***Properties and Qualities of the Glynwood Soil***

*Available water capacity:* About 6.1 inches to a depth of 40 inches

*Cation-exchange capacity of the surface layer:* 8 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

#### ***Similar:***

- Soils that have more sand and less clay in the subsoil and substratum than the Glynwood soil
- Soils that have a loam surface layer
- Somewhat poorly drained soils on slopes of 0 to 2 percent
- Soils that have a thicker subsoil than the Glynwood soil
- Eroded areas that have a surface layer of silty clay loam

#### ***Dissimilar:***

- Udorthents, loamy, near buildings and roads

### ***Use and Management Considerations***

#### **Building sites**

- In areas of the Glynwood soil, because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the Glynwood soil may crack foundations

and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.

- In some areas of the Glynwood soil, the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

#### **Septic tank absorption fields**

- The restricted permeability of the Glynwood soil limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table of the Glynwood soil greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

#### **Local roads and streets**

- Because of shrinking and swelling, the Glynwood soil may not be suitable for use as base material for local roads and streets.
- In areas of the Glynwood soil, local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table of the Glynwood soil affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, the Glynwood soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

#### ***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soils:* Glynwood—no; Urban land—unranked

### **HgA—Harrod silt loam, 0 to 1 percent slopes, frequently flooded**

#### ***Setting***

*Landform:* Flats and natural levees on flood plains

*Size of areas:* 2 to 30 acres

#### ***Map Unit Composition***

Harrod soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 5.6 inches to a depth of 33 inches

*Cation-exchange capacity of the surface layer:* 13 to 28 meq per 100 grams

*Depth class:* Moderately deep

*Depth to root-restrictive feature:* Bedrock (lithic) is at a depth of 20 to 40 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* Frequent

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Loamy alluvium overlying limestone or dolostone

*Permeability:* Moderate

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a thinner surface layer

*Dissimilar:*

- Very poorly drained soils that have a thicker surface layer, in backswamps

### ***Use and Management Considerations***

#### **Cropland**

- The rooting depth of crops is restricted by bedrock.
- Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Winter grain crops are commonly not grown because of frequent flooding.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Subsurface drainage helps to lower the seasonal high water table.
- The depth to bedrock may restrict the gradient needed to provide adequate drainage from subsurface systems.

#### **Pastureland (fig. 6)**

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- The root systems of plants may be damaged by frost action.
- Bedrock may restrict the rooting depth of plants.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.



**Figure 6.—Harrod silt loam, 0 to 1 percent slopes, frequently flooded (foreground) is commonly used for pasture. Fox loam, 2 to 6 percent slopes is in the background.**

- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Bedrock may interfere with the construction of haul roads and log landing sites.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- The frequent flooding greatly increases the risk of damage associated with floodwaters. Because of the flooding, this soil is generally unsuited to building site development.

#### **Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.
- Because of the limited depth to bedrock, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- The depth to bedrock and hardness of the bedrock reduce the ease of excavation and increase the difficulty of constructing roads.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

### ***Interpretive Groups***

*Land capability classification:* 3w

*Prime farmland:* Prime farmland if protected from flooding or not frequently flooded during the growing season

*Pasture and hayland suitability group:* B-3

*Hydric soil:* No

## **HpA—Houcktown sandy loam, 0 to 2 percent slopes**

### ***Setting***

*Landform:* Rises on ground moraines, end moraines, and lake plains

*Position on the landform:* Shoulders and summits

*Size of areas:* 2 to 10 acres

### ***Map Unit Composition***

Houcktown soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 5.9 inches to a depth of 48 inches

*Cation-exchange capacity of the surface layer:* 4 to 15 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Loamy water-sorted deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Sandy loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Moderate

### ***Additional Components***

*Similar:*

- Somewhat poorly drained soils that have a darker surface layer
- Soils that have more clay and less sand in the subsoil
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Soils that have a loam or silt loam surface layer
- Soils that have less clay in the substratum
- Soils that have a thicker subsoil

*Dissimilar:*

- Alvada soils in depressions

***Use and Management Considerations*****Cropland**

- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Systematic subsurface drainage extends the period of planting and harvesting crops.

**Pastureland**

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- The root systems of plants may be damaged by frost action.

**Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Soil wetness may limit the use of log trucks.
- An episode of fire may reduce soil productivity.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification: 1*

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

## **HpB—Houcktown sandy loam, 2 to 4 percent slopes**

### ***Setting***

*Landform:* Knolls on ground moraines, end moraines, and lake plains

*Position on the landform:* Summits, shoulders, and backslopes

*Size of areas:* 2 to 10 acres

### ***Map Unit Composition***

Houcktown soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 5.7 inches to a depth of 48 inches

*Cation-exchange capacity of the surface layer:* 4 to 15 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Loamy water-sorted deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Sandy loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Moderate

### ***Additional Components***

*Similar:*

- Soils that have a loam or silt loam surface layer
- Soils that have more clay and less sand in the subsoil
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Somewhat poorly drained soils that have a darker surface layer
- Soils that have slopes of 4 to 6 percent
- Soils that have less clay in the substratum
- Soils that have a thicker subsoil

*Dissimilar:*

- Alvada soils in depressions

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Subsurface drainage helps to lower the seasonal high water table.

**Pastureland**

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- The root systems of plants may be damaged by frost action.

**Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Soil wetness may limit the use of log trucks.
- An episode of fire may reduce soil productivity.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification: 2e*

*Prime farmland: All areas are prime farmland*

*Pasture and hayland suitability group: A-6*

*Hydric soil: No*

## **HrA—Houcktown loam, 0 to 2 percent slopes**

### ***Setting***

*Landform:* Rises on ground moraines, lake plains, and deltas on lake plains

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 20 acres

### ***Map Unit Composition***

Houcktown soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.6 inches to a depth of 51 inches

*Cation-exchange capacity of the surface layer:* 6 to 18 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy water-sorted deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam, clay loam, or sandy loam surface layer
- Somewhat poorly drained soils that have a darker surface layer
- Soils that have more clay in the subsoil
- Soils that have till at a depth of 40 to 60 inches
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Soils that have less clay in the substratum

*Dissimilar:*

- Pewamo soils in depressions

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Systematic subsurface drainage extends the period of planting and harvesting crops.

#### **Pastureland**

- The root systems of plants may be damaged by frost action.

**Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

**HrB—Houcktown loam, 2 to 6 percent slopes*****Setting***

*Landform:* Knolls on ground moraines and end moraines, lake plains, and deltas on lake plains

*Position on the landform:* Backslopes, summits, and shoulders

*Size of areas:* 2 to 35 acres

***Map Unit Composition***

Houcktown soil and similar components: 100 percent

***Soil Properties and Qualities***

*Available water capacity:* About 6.4 inches to a depth of 50 inches

*Cation-exchange capacity of the surface layer:* 6 to 18 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy water-sorted deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam, clay loam, or sandy loam surface layer
- Soils that have till at a depth of 40 to 60 inches
- Soils that have more clay in the subsoil
- Soils that have less clay in the substratum
- Somewhat poorly drained soils that have a darker surface layer
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- The root system of winter grain crops may be damaged by frost action.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site

development, and a special design of structures may be needed to prevent damage from wetness.

- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

#### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

### **HsA—Houcktown silt loam, 0 to 2 percent slopes**

#### ***Setting***

*Landform:* Rises on ground moraines, lake plains, and deltas on lake plains

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 20 acres

#### ***Map Unit Composition***

Houcktown soil and similar components: 95 percent

Dissimilar components: 5 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 6.4 inches to a depth of 48 inches

*Cation-exchange capacity of the surface layer:* 6 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy water-sorted deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High



Figure 7.—Houcktown silt loam, 0 to 2 percent slopes, is well suited to no-till corn.

*Shrink-swell potential:* Moderate  
*Surface layer texture:* Silt loam  
*Potential for surface runoff:* Medium  
*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Soils that have a surface layer of loam or silty clay loam
- Soils that have till at a depth of 40 to 60 inches
- Soils that have more clay and less sand in the subsoil
- Somewhat poorly drained soils
- Soils that have less clay in the substratum
- Soils that have a thicker subsoil

*Dissimilar:*

- Alvada soils in depressions

### ***Use and Management Considerations***

#### **Cropland (fig. 7)**

- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Systematic subsurface drainage extends the period of planting and harvesting crops.

**Pastureland**

- The root systems of plants may be damaged by frost action.

**Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

**HsB—Houcktown silt loam, 2 to 4 percent slopes*****Setting***

*Landform:* Knolls on ground moraines and end moraines

*Position on the landform:* Backslopes, shoulders, and summits

*Size of areas:* 2 to 20 acres

***Map Unit Composition***

Houcktown soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 5.5 inches to a depth of 44 inches

*Cation-exchange capacity of the surface layer:* 6 to 21 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy water-sorted deposits and the underlying till

*Permeability:* Moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have till at a depth of 40 to 60 inches
- Soils that have a surface layer of loam or silty clay loam
- Soils that have slopes of less than 2 percent
- Soils that have more clay and less sand in the subsoil
- Somewhat poorly drained soils
- Soils that have less clay in the substratum
- Soils that have a thicker subsoil

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- The root systems of plants may be damaged by frost action.

**Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification: 2e*

*Prime farmland: All areas are prime farmland*

*Pasture and hayland suitability group: A-6*

*Hydric soil: No*

**HuC2—Houcktown-Glynwood complex, 6 to 12 percent slopes, eroded*****Setting***

*Landform: Dissected areas along streams on ground moraines*

*Position on the landform: Backslopes and shoulders*

*Size of areas: 2 to 10 acres*

### **Map Unit Composition**

Houcktown soil and similar components: 65 percent

Glynwood soil and similar components: 25 percent

Dissimilar components: 10 percent

### **Soil Properties and Qualities**

*Available water capacity:* Houcktown—about 6.3 inches to a depth of 50 inches;

Glynwood—about 5.2 inches to a depth of 34 inches

*Cation-exchange capacity of the surface layer:* Houcktown—6 to 18 meq per 100 grams; Glynwood—12 to 27 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Houcktown—dense material is at a depth of 40 to 60 inches; Glynwood—dense material is at a depth of 25 to 50 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Houcktown—loamy water-sorted deposits and the underlying till; Glynwood—till

*Permeability:* Houcktown—moderate in the upper part of the subsoil, moderately slow or slow in the lower part of the subsoil, and slow or very slow in the substratum; Glynwood—slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Houcktown—loam; Glynwood—clay loam

*Potential for surface runoff:* Houcktown—high; Glynwood—very high

*Wind erosion hazard:* Slight

### **Additional Components**

#### *Similar:*

- Soils that have a darker surface layer
- Soils that have slopes of 2 to 6 percent
- Soils that have till at a depth of 40 to 60 inches
- Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet
- Somewhat poorly drained soils
- Glynwood soils that have less clay in the substratum
- Houcktown soils that have more clay in the surface layer
- Soils that have a thicker subsoil
- Soils that have slopes of 12 to 25 percent
- Areas that are underlain with lacustrine silts

#### *Dissimilar:*

- Severely eroded areas in similar landform positions (5 percent of map unit)
- Very poorly drained soils in drainageways (5 percent of map unit)

### **Use and Management Considerations**

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer of these soils, and the remaining surface layer is less productive and more difficult to manage.

- The root system of winter grain crops may be damaged by frost action.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the Glynwood soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Clods may form in areas of the Glynwood soil if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- In areas of the Glynwood soil, the rooting depth of crops may be restricted by the high clay content.
- In areas of the Glynwood soil, the movement of water into subsurface drains is restricted. Drainage guides can be used to determine tile spacing requirements.
- In areas of the Glynwood soil, including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.
- In areas of the Glynwood soil, plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- The Glynwood soil provides poor summer pasture.

### **Woodland**

- The low strength of the soils may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low strength of these soils, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low strength of these soils, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- Burning may destroy organic matter.
- The stickiness of the Glynwood soil reduces the efficiency of mechanical planting equipment.

### **Building sites**

- Because of a seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. These soils are poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soils may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope affects the use of machinery and the amount of excavation required.

Special building practices and designs may be required to ensure satisfactory performance.

- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- A seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the slope, designing local roads and streets is difficult.
- Because of shrinking and swelling, the Glynwood soil may not be suitable for use as base material for local roads and streets.
- Because of the low bearing strength, the Glynwood soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 3e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soils:* No

### **HvA—Hoytville silty clay loam, 0 to 1 percent slopes**

#### ***Setting***

*Landform:* Flats, depressions, and drainageways on lake plains

*Size of areas:* 5 to 1,000 acres

#### ***Map Unit Composition***

Hoytville soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 6.8 inches to a depth of 58 inches

*Cation-exchange capacity of the surface layer:* 17 to 35 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 50 to 70 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Perched

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Till

*Permeability:* Moderately slow in the upper part of the subsoil, slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silty clay surface layer
- Soils that have a surface layer more than 10 inches thick
- Soils that have more sand and less clay in the subsoil
- Areas that are underlain with lacustrine sediments
- Soils that have less clay in the substratum

*Dissimilar:*

- Nappanee soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

- Because of the stickiness of the soil, the use of equipment for site preparation is restricted to the drier periods.
- An episode of fire may reduce soil productivity.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

### **KnA—Knoxdale silt loam, 0 to 2 percent slopes, occasionally flooded**

#### ***Setting***

*Landform:* Rises and natural levees on flood plains

*Size of areas:* 2 to 100 acres

#### ***Map Unit Composition***

Knoxdale soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 12.0 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 9 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 3.5 to 6.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* Occasional

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Loamy alluvium

*Permeability:* Moderate in the subsoil and moderate or moderately rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have more than 15 percent rock fragments in the lower part of the substratum
- Soils that have a darker surface layer
- Moderately well drained soils
- Soils that have more sand in the subsoil

#### *Dissimilar:*

- Saranac soils in backswamps (5 percent of map unit)
- Shoals soils on flood plain steps (5 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Flooding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Under normal weather conditions, this soil is subject to occasional flooding. The

flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

#### **Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-5

*Hydric soil:* No

### **LbF—Lybrand silt loam, 20 to 55 percent slopes**

#### ***Setting***

*Landform:* Dissected areas along streams and glacial drainage channels on ground moraines and end moraines

*Position on the landform:* Backslopes

*Size of areas:* 2 to 40 acres

#### ***Map Unit Composition***

Lybrand soil and similar components: 100 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 6.7 inches to a depth of 42 inches

*Cation-exchange capacity of the surface layer:* 11 to 24 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 3.3 to 5.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 4.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Very high

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils in the less sloping areas
- Soils that have more sand and less clay in the subsoil
- Moderately well drained soils in the less sloping areas
- Soils that have a darker surface layer

### ***Use and Management Considerations***

#### **Pastureland**

- This soil is generally not recommended for pasture.

#### **Woodland**

- If the soil is disturbed, the slope increases the hazard of erosion.
- The slope increases excavation costs, poses safety hazards, and creates a potential for erosion during the construction of haul roads and log landings.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks and harvesting and mechanical planting equipment.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- Because of the slope, use of equipment to prepare this site for planting and seeding is not practical.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

#### **Building sites**

- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. Special design of structures is needed to prevent damage caused by wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

***Interpretive Groups***

*Land capability classification:* 7e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* A-3

*Hydric soil:* No

## **LcD2—Lybrand silty clay loam, 12 to 20 percent slopes, eroded**

***Setting***

*Landform:* Dissected areas along streams and glacial drainage channels on ground moraines and end moraines

*Position on the landform:* Backslopes

*Size of areas:* 2 to 10 acres

***Map Unit Composition***

Lybrand soil and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*Available water capacity:* About 8.0 inches to a depth of 54 inches

*Cation-exchange capacity of the surface layer:* 12 to 27 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 3.3 to 5.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Very high

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have more sand and less clay in the subsoil
- Moderately well drained soils in the less sloping areas

- Uneroded areas that have a silt loam surface layer
- Soils that have slopes of 6 to 12 percent

*Dissimilar:*

- Severely eroded areas in similar landform positions

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer, and the remaining surface layer is less productive and more difficult to manage.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.

#### **Woodland**

- If the soil is disturbed, the slope increases the hazard of erosion.
- The slope increases excavation costs, poses safety hazards, and creates a potential for erosion during the construction of haul roads and log landings.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope restricts the use of equipment for preparing sites for planting and seeding.
- Burning may destroy organic matter.

#### **Building sites**

- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. Special design of structures is needed to prevent damage caused by wetness.
- In some areas the dense nature of the substratum increases the difficulty of digging and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

***Interpretive Groups***

*Land capability classification:* 4e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

## **MbA—Medway silt loam, 0 to 2 percent slopes, occasionally flooded**

***Setting***

*Landform:* Flats on flood plains

*Size of areas:* 2 to 50 acres

***Map Unit Composition***

Medway soil and similar components: 95 percent

Dissimilar components: 5 percent

***Soil Properties and Qualities***

*Available water capacity:* About 10.6 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 13 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* Occasional

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Loamy alluvium

*Permeability:* Moderate in the subsoil and moderate or moderately rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam  
*Potential for surface runoff:* Low  
*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a surface layer less than 10 inches thick
- Soils that have more sand in the subsoil
- Well drained soils
- Somewhat poorly drained soils

*Dissimilar:*

- Very poorly drained soils in backswamps

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

#### **Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-5

*Hydric soil:* No

**MmA—Millsdale silty clay loam, 0 to 1 percent slopes*****Setting***

*Landform:* Depressions, drainageways, and flats on ground moraines

*Size of areas:* 2 to 50 acres

***Map Unit Composition***

Millsdale soil and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*Available water capacity:* About 5.7 inches to a depth of 35 inches

*Cation-exchange capacity of the surface layer:* 19 to 35 meq per 100 grams

*Depth class:* Moderately deep

*Depth to root-restrictive feature:* Bedrock (lithic) is at a depth of 20 to 40 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 4.0 to 7.0 percent

*Parent material:* Till overlying limestone or dolostone

*Permeability:* Moderately slow

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have a surface layer less than 10 inches thick
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a lighter colored surface layer

*Dissimilar:*

- Somewhat poorly drained soils on rises (5 percent of map unit)
- Milton soils on rises (5 percent of map unit)

***Use and Management Considerations*****Cropland**

- The rooting depth of crops is restricted by bedrock and a high clay content.
- Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.
- The depth to bedrock may restrict the gradient needed to provide adequate drainage from subsurface systems.

**Pastureland**

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Bedrock may restrict the rooting depth of plants.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Bedrock may interfere with the construction of haul roads and log landing sites.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

**Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building

maintenance may be needed. The soil is generally unsuited to building site development.

- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- Because of the limited depth to bedrock and ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- The depth to bedrock and hardness of the bedrock reduce the ease of excavation and increase the difficulty of constructing roads.
- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 3w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-2

*Hydric soil:* Yes

### **MnA—Milton loam, 0 to 2 percent slopes**

#### ***Setting***

*Landform:* Rises and flats on ground moraines

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 20 acres

#### ***Map Unit Composition***

Milton soil and similar components: 95 percent

Dissimilar components: 5 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 4.5 inches to a depth of 28 inches

*Cation-exchange capacity of the surface layer:* 12 to 25 meq per 100 grams

*Depth class:* Moderately deep

*Depth to root-restrictive feature:* Bedrock (lithic) is at a depth of 20 to 40 inches

*Depth to the top of the seasonal high water table:* 1.5 to 3.0 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 5.0 percent

*Parent material:* Loamy glaciofluvial deposits overlying limestone and dolostone

*Permeability:* Moderate

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have bedrock at a depth of 40 to 60 inches
- Somewhat poorly drained soils

*Dissimilar:*

- Millsdale soils in depressions

### ***Use and Management Considerations***

#### **Cropland**

- The rooting depth of crops is restricted by bedrock.
- Plants may suffer from moisture stress because of the limited available water capacity.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.

#### **Pastureland**

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Bedrock may restrict the rooting depth of plants.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Bedrock may interfere with the construction of haul roads and log landing sites.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- The depth to bedrock and hardness of the bedrock greatly reduce the ease of excavation and increase the difficulty in constructing foundations and installing utilities.
- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- Because of the limited depth to bedrock, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- The depth to bedrock and hardness of the bedrock reduce the ease of excavation and increase the difficulty of constructing roads.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2s

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* F-1

*Hydric soil:* No

**NpA—Nappanee clay loam, 0 to 2 percent slopes*****Setting***

*Landform:* Rises and flats on lake plains

*Position on the landform:* Summits and shoulders

*Size of areas:* 2 to 25 acres

***Map Unit Composition***

Nappanee soil and similar components: 95 percent

Dissimilar components: 5 percent

***Soil Properties and Qualities***

*Available water capacity:* About 6.2 inches to a depth of 52 inches

*Cation-exchange capacity of the surface layer:* 12 to 27 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 60 inches

*Depth to the top of the seasonal high water table:* 0.5 to 1.0 foot

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Till

*Permeability:* Slow in the subsoil and slow or very slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Clay loam

*Potential for surface runoff:* Medium

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have a surface layer of silt loam or silty clay loam
- Poorly drained soils
- Soils that have less clay in the subsoil and substratum

*Dissimilar:*

- Hoytville soils in drainageways and depressions

***Use and Management Considerations*****Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

**Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- Because of the stickiness of the soil, the use of equipment for site preparation is restricted to the drier periods.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of

effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 3w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-2

*Hydric soil:* No

### **PaA—Patton silty clay loam, loamy substratum, 0 to 1 percent slopes**

#### ***Setting***

*Landform:* Depressions and drainageways on ground moraines

*Size of areas:* 2 to 40 acres

#### ***Map Unit Composition***

Patton soil and similar components: 100 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 12.0 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 16 to 31 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 5.0 percent

*Parent material:* Glaciolacustrine deposits

*Permeability:* Moderate or moderately slow in the upper part of the subsoil, moderate in the lower part of the subsoil and upper part of the substratum, and moderately rapid in the lower part of the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have a surface layer that is less than 10 inches thick
- Soils that have more clay in the subsoil
- Soils that have till at a depth of 40 to 80 inches

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. This soil is generally unsuited to building site development.

#### **Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

## **PmA—Pewamo silty clay loam, 0 to 1 percent slopes**

### ***Setting***

*Landform:* Depressions and drainageways on ground moraines and end moraines

*Size of areas:* 2 to 500 acres

### ***Map Unit Composition***

Pewamo soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 10.2 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 17 to 34 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 5.0 percent

*Parent material:* Till

*Permeability:* Moderately slow

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a surface layer less than 10 inches thick
- Soils that have more clay in the lower part of the subsoil and in the substratum
- Soils that have less clay in the substratum
- Soils that have a silt loam surface layer
- Soils that have more silt and less clay in the subsoil

*Dissimilar:*

- Blount soils on backslopes, shoulders, and summits



Figure 8.—Grassed waterways are used to direct excess surface water and reduce the rate of water movement from areas of Pewamo silty clay loam, 0 to 1 percent slopes.

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water (fig. 8).
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.

- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

#### **Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

### **PoA—Pewamo-Urban land complex, 0 to 2 percent slopes**

#### ***Setting***

*Landform:* Depressions and drainageways on ground moraines and end moraines

*Size of areas:* 2 to 50 acres

#### ***Map Unit Composition***

Pewamo soil and similar components: 55 percent

Urban land and similar components: 35 percent

Dissimilar components: 10 percent

#### ***Properties and Qualities of the Pewamo Soil***

*Available water capacity:* About 10.3 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 17 to 34 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 5.0 percent

*Parent material:* Till

*Permeability:* Moderately slow

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### ***Similar:***

- Soils that have a surface layer less than 10 inches thick
- Soils that have a silt loam surface layer
- Soils that have less clay in the subsoil and substratum than the Pewamo soil
- Soils that have more clay in the lower part of the subsoil and in the substratum than the Pewamo soil
- Soils that have less clay in the substratum than the Pewamo soil

#### ***Dissimilar:***

- Blount soils on rises (5 percent of map unit)
- Udorthents adjacent to buildings and roads (5 percent of map unit)

### ***Use and Management Considerations***

#### **Building sites**

- Because water tends to pond on the Pewamo soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. This soil is generally unsuited to building site development.
- In some areas of the Pewamo soil, the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

#### **Septic tank absorption fields**

- Because of ponding, the Pewamo soil is generally unsuited to use as sites for septic tank absorption fields.
- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the Pewamo soil.
- Because of shrinking and swelling, the Pewamo soil may not be suitable for use as base material for local roads and streets.
- In areas of the Pewamo soil, local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, the Pewamo soil is generally unsuitable for

supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

- An onsite investigation is needed to determine the suitability of areas of Urban land for specific uses.

### ***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soils:* Pewamo—yes; Urban land—unranked

## **Pp—Pits, gravel**

### ***Setting***

*Landform:* Gravel pits on glacial drainage channels and outwash plains

*Size of areas:* 2 to 20 acres

### ***Map Unit Composition***

Pits and similar components: 95 percent

Dissimilar components: 5 percent

### ***General Description***

This map unit includes piles of sorted sand and gravel, water filled pits less than 2 acres in size, and vertical pit walls.

### ***Additional Components***

*Dissimilar:*

- Fox soils at the margins of map units

### ***Use and Management Considerations***

An onsite investigation is needed to determine the suitability of this map unit for specific uses.

### ***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soil:* Unranked

## **Ps—Pits, lime**

### ***Setting***

*Landform:* Open excavations on ground moraines

*Size of areas:* 5 to 15 acres

### ***Map Unit Composition***

Pits and similar components: 95 percent

Dissimilar components: 5 percent

### ***General Description***

This map unit consists of diked areas filled with lime-rich slurry.

***Additional Components****Dissimilar:*

- Udorthents, loamy, adjacent to dikes

***Use and Management Considerations***

An onsite investigation is needed to determine the suitability of this map unit for specific uses.

***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soil:* Unranked

**Pt—Pits, quarry*****Setting***

*Landform:* Quarries on ground moraines

*Size of areas:* 10 to 50 acres

***Map Unit Composition***

Pits and similar components: 95 percent

Dissimilar components: 5 percent

***General Description***

This map unit consists of deep, open-pit excavations with vertical rock walls, small pools of water, and piles of crushed and sorted rock.

***Additional Components****Dissimilar:*

- Udorthents, loamy, near the margins of map units

***Use and Management Considerations***

An onsite investigation is needed to determine the suitability of this map unit for specific uses.

***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soil:* Unranked

**RdA—Rensselaer loam, 0 to 1 percent slopes*****Setting***

*Landform:* Drainageways and depressions on glacial drainage channels

*Size of areas:* 30 to 100 acres

***Map Unit Composition***

Rensselaer soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.5 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 10 to 29 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 6.0 percent

*Parent material:* Loamy deposits

*Permeability:* Moderate

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a sandy loam or silt loam surface layer
- Soils that have a surface layer less than 10 inches thick
- Soils that have more silt and less sand in the subsoil

*Dissimilar:*

- Somewhat poorly drained soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

**Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

**ReA—Rensselaer loam, till substratum, 0 to 1 percent slopes*****Setting***

*Landform:* Flats, drainageways, and depressions on glacial drainage channels, deltas on lake plains, lake plains, and ground moraines

*Size of areas:* 2 to 200 acres

***Map Unit Composition***

Rensselaer soil and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*Available water capacity:* About 11.6 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 10 to 29 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 6.0 percent

*Parent material:* Loamy deposits overlying till

*Permeability:* Moderate in the subsoil and in the upper part of the substratum and slow or moderately slow in the lower part of the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### ***Similar:***

- Soils that have a silt loam or sandy loam surface layer
- Soils that have a surface layer less than 10 inches thick
- Soils that have more silt and less sand in the subsoil
- Soils that have till at a depth of 40 to 60 inches
- Soils that have gravelly strata in the substratum

#### ***Dissimilar:***

- Somewhat poorly drained soils

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

**Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

**RgA—Rensselaer silt loam, 0 to 1 percent slopes*****Setting***

*Landform:* Flats, drainageways, and depressions on glacial drainage channels and lake plains

*Size of areas:* 2 to 100 acres

***Map Unit Composition***

Rensselaer soil and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*Available water capacity:* About 11.4 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 13 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 6.0 percent

*Parent material:* Loamy deposits

*Permeability:* Moderate

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have a surface layer of sandy loam, silty clay loam, or loam
- Soils that have a surface layer less than 10 inches thick
- Soils that have more silt and less sand in the subsoil

#### *Dissimilar:*

- Darroch soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

#### **Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

## **RoA—Roundhead muck, loamy substratum, 0 to 1 percent slopes**

### ***Setting***

*Landform:* Depressions on ground moraines

*Size of areas:* 5 to 35 acres

### ***Map Unit Composition***

Roundhead soil: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 9.9 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 110 to 150 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 55.0 to 75.0 percent

*Parent material:* Thin layer of organic material and the underlying clayey and silty glaciolacustrine deposits, over loamy and gravelly glaciofluvial deposits

*Permeability:* Moderate or moderately rapid in the organic material, slow or moderately slow in the glaciolacustrine material, and moderate or moderately rapid in the glaciofluvial material

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Muck

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Severe

### ***Additional Components***

*Dissimilar:*

- Patton soils in drainageways and depressions

### ***Use and Management Considerations***

#### **Cropland**

- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- The rooting depth of crops may be restricted by the high clay content.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsidence or shrinkage of the muck causes displacement of subsurface drains.
- Control of the water table helps to reduce subsidence, prevent burning, and reduce the hazard of wind erosion.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.
- The soil may be deficient in micronutrients because of the high content of organic matter.

**Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

**Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.
- In some areas the high content of clay in the upper part of the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

### ***Interpretive Groups***

*Land capability classification:* 3w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* D-1

*Hydric soil:* Yes

## **SbA—Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded**

### ***Setting***

*Landform:* Backswamps and flats on flood plains

*Size of areas:* 2 to 100 acres

### ***Map Unit Composition***

Saranac soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 10.0 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 17 to 33 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 0.5 foot

*Drainage class:* Very poorly drained

*Flooding:* Rare

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Clayey alluvium

*Permeability:* Moderately slow or slow

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a surface layer less than 10 inches thick
- Poorly drained soils that have a lighter colored surface layer

*Dissimilar:*

- Somewhat poorly drained soils on natural levees

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.

- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

### **Building sites**

- Under unusual weather conditions, this soil is subject to rare flooding. The flooding may result in physical damage and costly repairs to buildings (fig. 9). This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent the damage caused by flooding.
- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

### **Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.
- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.



**Figure 9.—Flooding can damage property in areas of Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded.**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

#### ***Interpretive Groups***

*Land capability classification:* 3w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-2

*Hydric soil:* Yes

### **ScA—Saranac silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded**

#### ***Setting***

*Landform:* Backswamps and flats on flood plains

*Size of areas:* 2 to 100 acres

#### ***Map Unit Composition***

Saranac soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 9.4 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 17 to 33 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 0.5 foot

*Drainage class:* Very poorly drained

*Flooding:* Frequent

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Clayey alluvium overlying till

*Permeability:* Moderately slow or slow in the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a surface layer less than 10 inches thick
- Soils that have lighter colored overwash
- Soils that have less clay and more sand in the subsoil
- Soils that have till at a depth of 60 to 80 inches

*Dissimilar:*

- Knoxdale soils on natural levees

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Winter grain crops are commonly not grown because of frequent flooding.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- A combination of surface and subsurface drainage helps to remove excess water.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

**Building sites**

- The frequent flooding in areas of this soil greatly increases the risk of damage associated with floodwaters. Because of the flooding, this soil is generally unsuited to building site development.
- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. This soil is generally unsuited to building site development.

**Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.
- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

***Interpretive Groups***

*Land capability classification: 3w*

*Prime farmland:* Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

*Pasture and hayland suitability group:* C-3

*Hydric soil:* Yes

## **SdB—Seward loamy fine sand, deep phase, 0 to 5 percent slopes**

### ***Setting***

*Landform:* Knolls and rises on ground moraines

*Position on the landform:* Summits, backslopes, and shoulders

*Size of areas:* 2 to 20 acres

### ***Map Unit Composition***

Seward soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 6.9 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 3 to 15 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 40 to 65 inches

*Depth to the top of the seasonal high water table:* 1.5 to 3.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Sandy and loamy glaciolacustrine deposits and the underlying till

*Permeability:* Rapid in the sandy material, moderate in the loamy subsoil material, slow in the lower part of the subsoil, and slow or very slow in the substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loamy fine sand

*Potential for surface runoff:* Very low

*Wind erosion hazard:* Severe

### ***Additional Components***

*Similar:*

- Soils that have till at a depth of 20 to 40 inches
- Soils that have more clay in the upper part of the subsoil
- Soils that have a sandy loam surface layer
- Soils that have less clay in the subsoil

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.

**Pastureland**

- Erosion control is needed when pastures are renovated.

**Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- An episode of fire may reduce soil productivity.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

**Septic tank absorption fields**

- The excessive permeability in the upper part of the soil limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability in the lower part of this soil limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

**SfB—Shawtown loam, 2 to 6 percent slopes*****Setting***

*Landform:* Knolls on ground moraines, glacial drainage channels, stream terraces, outwash plains, and beach ridges on lake plains

*Position on the landform:* Summits, shoulders, backslopes, and risers

*Size of areas:* 2 to 50 acres

***Map Unit Composition***

Shawtown soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 8.1 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 7 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* Dense material is at a depth of 50 to 70 inches

*Depth to the top of the seasonal high water table:* 2.0 to 3.5 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Stratified water-sorted deposits overlying till

*Permeability:* Moderate in the loamy subsoil, rapid in the sandy and gravelly substratum, and slow or very slow in the till substratum

*Potential for frost action:* Moderate

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have till at a depth of 40 to 50 inches
- Well drained soils
- Soils that have a sandy loam surface layer
- Soils that have slopes of 0 to 2 percent
- Soils that have slopes of 6 to 12 percent

*Dissimilar:*

- Aurand soils on flats (3 percent of map unit)
- Houcktown soils in similar landform positions (2 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- Grassed waterways can be used in some areas to slow and direct the movement of water and minimize erosion.
- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.

#### **Pastureland**

- Erosion control is needed when pastures are renovated.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be

made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.

- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

#### **Septic tank absorption fields**

- The excessive permeability limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

#### ***Interpretive Groups***

*Land capability classification:* 2e

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-1

*Hydric soil:* No

## **SgC2—Shinrock clay loam, 6 to 12 percent slopes, eroded**

#### ***Setting***

*Landform:* Dissected areas along streams on lake plains

*Position on the landform:* Shoulders and backslopes

*Size of areas:* 2 to 10 acres

#### ***Map Unit Composition***

Shinrock soil and similar components: 95 percent

Dissimilar components: 5 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 7.7 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 12 to 28 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.0 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Till overlying glaciolacustrine deposits

*Permeability:* Slow or moderately slow in the upper part of the subsoil and moderate or moderately slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Clay loam

*Potential for surface runoff:* High

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have more sand in the subsoil
- Soils that have slopes of 2 to 6 percent
- Uneroded areas that have a silt loam or loam surface layer
- Soils that have a darker loam surface layer

#### *Dissimilar:*

- Severely eroded areas in similar landform positions

### ***Use and Management Considerations***

#### **Cropland**

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize the amount of soil lost through erosion.
- Erosion has removed part of the surface layer, and the remaining surface layer is less productive and more difficult to manage.
- The root system of winter grain crops may be damaged by frost action.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil that facilitate the movement of water into subsurface drains.

#### **Pastureland**

- Preventing overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- The slope causes unsafe operating conditions and reduces the operating efficiency of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The slope may restrict the use of some mechanical planting equipment.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- Burning may destroy organic matter.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- The moderate shrinking and swelling of the soil may crack foundations and basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope affects the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- In some areas the high content of clay in the subsoil increases the difficulty of digging, filling, and compacting the soil material in shallow excavations.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

***Interpretive Groups***

*Land capability classification:* 3e

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

## **ShA—Shoals silt loam, 0 to 1 percent slopes, occasionally flooded**

***Setting***

*Landform:* Flats on flood plains

*Size of areas:* 2 to 50 acres

***Map Unit Composition***

Shoals soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.7 inches to a depth of 60 inches  
*Cation-exchange capacity of the surface layer:* 12 to 27 meq per 100 grams  
*Depth class:* Very deep  
*Depth to root-restrictive feature:* More than 80 inches  
*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet  
*Kind of water table:* Apparent  
*Ponding:* None  
*Drainage class:* Somewhat poorly drained  
*Flooding:* Occasional  
*Organic matter content in the surface layer:* 2.0 to 4.0 percent  
*Parent material:* Loamy alluvium  
*Permeability:* Moderate in the subsoil and moderate or moderately rapid in the substratum  
*Potential for frost action:* High  
*Shrink-swell potential:* Low  
*Surface layer texture:* Silt loam  
*Potential for surface runoff:* Negligible  
*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have more gravel in the lower part of the substratum
- Soils that have a loam surface layer
- Soils that have more silt and less sand in the subsoil
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a darker surface layer

#### *Dissimilar:*

- Knoxdale soils on natural levees (5 percent of map unit)
- Saranac soils in backswamps (5 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

**Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

***Interpretive Groups***

*Land capability classification: 2w*

*Prime farmland: Prime farmland if drained*

*Pasture and hayland suitability group: C-3*

*Hydric soil: No*

**SkA—Shoals silt loam, till substratum, 0 to 1 percent slopes, occasionally flooded*****Setting***

*Landform: Flats on flood plains*

*Size of areas: 2 to 60 acres*

### ***Map Unit Composition***

Shoals soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.6 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 12 to 27 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* Occasional

*Organic matter content in the surface layer:* 2.0 to 4.0 percent

*Parent material:* Loamy alluvium overlying till

*Permeability:* Moderate in the subsoil and moderately slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Moderately well drained soils
- Soils that have a surface layer of silty clay loam
- Soils that have till at a depth of 40 to 60 inches
- Soils that have more silt and less sand in the subsoil
- Soils that have a darker surface layer

#### *Dissimilar:*

- Blount soils at the margins of map units

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.

- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

### **Building sites**

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

### **Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-3

*Hydric soil:* No

## **SnA—Sleeth silt loam, 0 to 2 percent slopes**

### ***Setting***

*Landform:* Rises and flats on outwash plains and stream terraces

*Position on the landform:* Summits on outwash plains and treads on stream terraces

*Size of areas:* 2 to 25 acres

### ***Map Unit Composition***

Sleeth soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.3 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 6 to 18 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Outwash

*Permeability:* Moderate in the loamy subsoil and rapid or very rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Silt loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Moderately well drained soils
- Soils that have a surface layer of fine sandy loam or loam

*Dissimilar:*

- Westland soils in drainageways and depressions

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.

- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

**Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

**Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* No

**SoA—Sloan silty clay loam, 0 to 1 percent slopes,  
occasionally flooded*****Setting***

*Landform:* Backswamps and flats on flood plains

*Size of areas:* 5 to 50 acres

***Map Unit Composition***

Sloan soil and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*Available water capacity:* About 10.5 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 17 to 33 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* Occasional

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Loamy alluvium

*Permeability:* Moderately slow or moderate

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have a silt loam surface layer
- Soils that have till at a depth of 60 to 80 inches
- Soils that have more clay and less sand in the subsoil
- Soils that have a surface layer less than 10 inches thick
- Soils that have a lighter colored surface layer

#### *Dissimilar:*

- Medway soils on flats (5 percent of map unit)
- Shoals soils on flats (5 percent of map unit)

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

**Building sites**

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.
- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

**Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.
- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

***Interpretive Groups***

*Land capability classification: 3w*

*Prime farmland: Prime farmland if drained*

*Pasture and hayland suitability group: C-3*

*Hydric soil: Yes*

## **SrA—Sloan silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded**

### ***Setting***

*Landform:* Backswamps and flats on flood plains

*Size of areas:* 2 to 80 acres

### ***Map Unit Composition***

Sloan soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 10.6 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 17 to 33 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* Frequent

*Organic matter content in the surface layer:* 3.0 to 6.0 percent

*Parent material:* Loamy alluvium overlying till

*Permeability:* Moderately slow or moderate in the upper part of the soil and moderately slow in the till substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Silty clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

#### ***Similar:***

- Soils that have till at a depth of 40 to 60 inches
- Soils that have a silt loam surface layer
- Soils that have a surface layer less than 10 inches thick
- Poorly drained soils that have a lighter colored surface layer
- Soils that have loam till
- Soils that have limestone bedrock at a depth of 60 to 80 inches

#### ***Dissimilar:***

- Shoals soils on flats

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

- Winter grain crops are commonly not grown because of frequent flooding.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- A combination of surface and subsurface drainage helps to remove excess water.

**Pastureland**

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

**Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Flooding may result in damage to haul roads and increased maintenance costs.
- Soil wetness may limit the use of log trucks.
- Flooding restricts the safe use of roads by log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.
- An episode of fire may reduce soil productivity.

**Building sites**

- The frequent flooding in areas of this soil greatly increases the risk of damage associated with floodwaters. Because of the flooding, this soil is generally unsuited to building site development.
- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

**Septic tank absorption fields**

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.
- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, this soil is generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- A special design of roads and bridges is needed to prevent the damage caused by flooding.

### ***Interpretive Groups***

*Land capability classification:* 3w

*Prime farmland:* Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

*Pasture and hayland suitability group:* C-3

*Hydric soil:* Yes

## **ThB—Thackery sandy loam, sandy substratum, 1 to 3 percent slopes**

### ***Setting***

*Landform:* Knolls on outwash plains and stream terraces

*Position on the landform:* Shoulders, backslopes, summits, and risers

*Size of areas:* 2 to 25 acres

### ***Map Unit Composition***

Thackery soil and similar components: 95 percent

Dissimilar components: 5 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.0 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 3 to 13 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.5 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 0.5 to 2.0 percent

*Parent material:* Outwash

*Permeability:* Moderate in the subsoil and rapid or very rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Sandy loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Moderate

### ***Additional Components***

*Similar:*

- Soils that have a silt loam or loam surface layer
- Somewhat poorly drained soils

- Soils that have till at a depth of 60 to 80 inches
- Well drained soils

*Dissimilar:*

- Westland soils in depressions

### ***Use and Management Considerations***

#### **Cropland**

- Maintaining a vegetative cover and establishing windbreaks reduce the hazard of wind erosion.
- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Systematic subsurface drainage extends the period of planting and harvesting crops.

#### **Pastureland**

- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Soil wetness may limit the use of log trucks.
- An episode of fire may reduce soil productivity.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.

#### **Septic tank absorption fields**

- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

### ***Interpretive Groups***

*Land capability classification: 1*

*Prime farmland: All areas are prime farmland*

*Pasture and hayland suitability group: A-6*

*Hydric soil: No*

## **TkA—Thackery loam, sandy substratum, 0 to 2 percent slopes**

### ***Setting***

*Landform:* Flats and rises on outwash plains and stream terraces

*Position on the landform:* Summits, shoulders, and treads

*Size of areas:* 2 to 30 acres

### ***Map Unit Composition***

Thackery soil and similar components: 100 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 11.7 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 8 to 22 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 1.0 to 2.5 feet

*Kind of water table:* Apparent

*Ponding:* None

*Drainage class:* Moderately well drained

*Flooding:* None

*Organic matter content in the surface layer:* 1.0 to 3.0 percent

*Parent material:* Outwash

*Permeability:* Moderate in the subsoil and rapid or very rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Low

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam or sandy loam surface layer
- Well drained soils
- Somewhat poorly drained soils

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Systematic subsurface drainage extends the period of planting and harvesting crops.

#### **Pastureland**

- The root systems of plants may be damaged by frost action.

#### **Woodland**

- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.

- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.
- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

#### **Septic tank absorption fields**

- The excessive permeability in the substratum limits the proper treatment of effluent from septic systems. The poorly treated effluent may pollute the water table in the area of the absorption field.
- The restricted permeability in the subsoil limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

#### **Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 1

*Prime farmland:* All areas are prime farmland

*Pasture and hayland suitability group:* A-6

*Hydric soil:* No

### **TnA—Tiderishi loam, 0 to 2 percent slopes**

#### ***Setting***

*Landform:* Flats and rises on ground moraines and on lake plains and stream terraces

*Position on the landform:* Summits

*Size of areas:* 2 to 30 acres

#### ***Map Unit Composition***

Tiderishi soil and similar components: 90 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* About 8.7 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 12 to 25 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.5 foot to 1.5 feet

*Kind of water table:* Perched

*Ponding:* None

*Drainage class:* Somewhat poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 3.0 to 5.0 percent

*Parent material:* Stratified, loamy deposits overlying till

*Permeability:* Moderate in the subsoil and moderately slow or slow in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Loam

*Potential for surface runoff:* Low

*Wind erosion hazard:* Slight

### ***Additional Components***

#### *Similar:*

- Soils that have till at a depth of 60 to 80 inches
- Soils that have till at a depth of 20 to 40 inches
- Soils that have a surface layer that is less than 10 inches thick
- Soils that have more clay in the subsoil
- Soils that have a lighter colored surface layer
- Moderately well drained soils

#### *Dissimilar:*

- Rensselaer soils in drainageways and depressions

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- Subsurface drainage helps to lower the seasonal high water table.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because of the seasonal high water table, the period when excavations can be made may be restricted and a higher degree of construction site development and building maintenance may be required. This soil is poorly suited to building site development, and a special design of structures may be needed to prevent damage from wetness.

**Septic tank absorption fields**

- The restricted permeability limits the absorption and proper treatment of effluent from septic systems.
- The seasonal high water table greatly limits the absorption and proper treatment of effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

**Local roads and streets**

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* No

**UdA—Udorthents, loamy, 0 to 2 percent slopes*****Setting***

*Landform:* Fill areas, cut areas (for roads, railroads, etc.), and sanitary landfills on ground moraines, end moraines, and lake plains

*Size of areas:* 2 to 75 acres

***Map Unit Composition***

Udorthents and similar components: 90 percent

Dissimilar components: 10 percent

***Soil Properties and Qualities***

*General description:* Mixed, calcareous fill material, primarily till

*Available water capacity:* About 60 inches

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Ponding:* None

*Flooding:* None

*Permeability:* Very slow

*Potential for frost action:* Not rated

*Shrink-swell potential:* Not rated

*Potential for surface runoff:* Not rated

*Wind erosion hazard:* Slight

***Additional Components***

*Similar:*

- Soils that have slopes of 2 to 6 percent
- Soils that have more sand and rock fragments

*Dissimilar:*

- Occasionally flooded areas on flood plains (5 percent of map unit)
- Pewamo soils in drainageways and depressions (5 percent of map unit)

### ***Use and Management Considerations***

An onsite investigation is needed to determine the suitability of this map unit for specific uses.

### ***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soils:* No

## **UdD—Udorthents, loamy, 12 to 25 percent slopes**

### ***Setting***

*Landform:* Fill areas, cut areas (for roads, railroads, etc.), and ponds on ground moraines, end moraines, and lake plains

*Size of areas:* 2 to 40 acres

### ***Map Unit Composition***

Udorthents and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*General description:* Mixed, calcareous fill material, primarily till based

*Available water capacity:* About 60 inches

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Ponding:* None

*Flooding:* None

*Permeability:* Very slow

*Potential for frost action:* Not rated

*Shrink-swell potential:* Not rated

*Potential for surface runoff:* Not rated

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Less sloping areas on top of embankments and around pond sites
- Steeper areas around upground reservoirs

*Dissimilar:*

- Poorly drained soils in depressions at the centers of cloverleaves

### ***Use and Management Considerations***

An onsite investigation is needed to determine the suitability of this map unit for specific uses.

### ***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soils:* No

## UrB—Urban land, undulating

### ***Setting***

*Landform:* Urban land on ground moraines, end moraines, and lake plains

*Size of areas:* 10 to 250 acres

### ***Map Unit Composition***

- Urban land and similar components: 100 percent

### ***Use and Management Considerations***

An onsite investigation is needed to determine the suitability of this map unit for specific uses.

### ***Interpretive Groups***

*Land capability classification:* None assigned

*Prime farmland:* Not prime farmland

*Pasture and hayland suitability group:* Not rated

*Hydric soil:* Unranked

## W—Water

### ***Setting***

This map unit consists of areas inundated with water for most of the year.

### ***Map Unit Composition***

This map unit generally includes rivers, lakes, and ponds.

### ***Use and Management Considerations***

No interpretations are given for this map unit.

## WdA—Westland clay loam, 0 to 1 percent slopes

### ***Setting***

*Landform:* Depressions and drainageways on outwash plains and glacial drainage channels

*Size of areas:* 2 to 100 acres

### ***Map Unit Composition***

Westland soil and similar components: 90 percent

Dissimilar components: 10 percent

### ***Soil Properties and Qualities***

*Available water capacity:* About 9.2 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* 10 to 26 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* 2.0 to 5.0 percent

*Parent material:* Loamy deposits and the underlying sandy and gravelly outwash

*Permeability:* Moderate in the subsoil and very rapid in the substratum

*Potential for frost action:* High

*Shrink-swell potential:* Moderate

*Surface layer texture:* Clay loam

*Potential for surface runoff:* Negligible

*Wind erosion hazard:* Slight

### ***Additional Components***

*Similar:*

- Soils that have a silt loam or loam surface layer

*Dissimilar:*

- Somewhat poorly drained soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low soil strength may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

#### **Building sites**

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

- Because of the high content of sand or gravel in the soil, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

#### **Septic tank absorption fields**

- Because of ponding, this soil is generally unsuited to use as sites for septic tank absorption fields.

#### **Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- A special design of roads and streets is needed to prevent the structural damage caused by low soil strength.

#### ***Interpretive Groups***

*Land capability classification:* 2w

*Prime farmland:* Prime farmland if drained

*Pasture and hayland suitability group:* C-1

*Hydric soil:* Yes

### **WeA—Westland-Rensselaer complex, 0 to 1 percent slopes**

#### ***Setting***

*Landform:* Depressions and drainageways on outwash plains and glacial drainage channels

*Size of areas:* 2 to 200 acres

#### ***Map Unit Composition***

Westland soil and similar components: 50 percent

Rensselaer soil and similar components: 40 percent

Dissimilar components: 10 percent

#### ***Soil Properties and Qualities***

*Available water capacity:* Westland—about 9.8 inches to a depth of 60 inches;

Rensselaer—about 11.8 inches to a depth of 60 inches

*Cation-exchange capacity of the surface layer:* Westland—10 to 26 meq per 100 grams; Rensselaer—10 to 29 meq per 100 grams

*Depth class:* Very deep

*Depth to root-restrictive feature:* More than 80 inches

*Depth to the top of the seasonal high water table:* 0.0 to 1.0 foot

*Kind of water table:* Apparent

*Ponding (duration):* Brief

*Depth of ponding:* 0.0 to 1.0 foot

*Drainage class:* Very poorly drained

*Flooding:* None

*Organic matter content in the surface layer:* Westland—2.0 to 5.0 percent;

Rensselaer—2.0 to 6.0 percent

*Parent material:* Westland—loamy deposits and the underlying sandy and gravelly outwash; Rensselaer—loamy deposits

*Permeability:* Westland—moderate in the subsoil and very rapid in the substratum; Rensselaer—moderate

*Potential for frost action:* High  
*Shrink-swell potential:* Low  
*Surface layer texture:* Loam  
*Potential for surface runoff:* Negligible  
*Wind erosion hazard:* Slight

### ***Additional Components***

#### ***Similar:***

- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of clay loam, silt loam, fine sandy loam, or silty clay loam
- Soils that have a surface layer less than 10 inches thick

#### ***Dissimilar:***

- Somewhat poorly drained soils on rises

### ***Use and Management Considerations***

#### **Cropland**

- The root system of winter grain crops may be damaged by frost action.
- The careful selection and application of chemicals and fertilizers helps to minimize the possibility of ground-water contamination.
- A combination of surface and subsurface drainage helps to remove excess water.

#### **Pastureland**

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

#### **Woodland**

- A seasonal high water table can inhibit the growth of some species of seedlings by reducing root respiration.
- The low strength of these soils may cause the formation of ruts, which can result in unsafe conditions and damage to equipment.
- Because of the low soil strength, the cost of constructing haul roads and log landings is increased.
- Soil wetness may limit the use of log trucks.
- Ponding restricts the safe use of roads by log trucks.
- Because of the low soil strength, harvesting equipment may be difficult to operate and damage may result. The low soil strength may create unsafe conditions for log trucks.

#### **Building sites**

- Because water tends to pond on these soils, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soils are generally unsuited to building site development.
- Because of the high content of sand or gravel in the soils, the resistance to sloughing is reduced in shallow excavations and cutbanks are susceptible to caving.

#### **Septic tank absorption fields**

- Because of ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

**Local roads and streets**

- Ponding affects the ease of excavation and grading and limits the bearing capacity of the soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the low bearing strength, these soils are generally unsuitable for supporting heavy loads. A special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

***Interpretive Groups***

*Land capability classification: 2w*

*Prime farmland: Prime farmland if drained*

*Pasture and hayland suitability group: C-1*

*Hydric soils: Yes*



# Use and Management of the Soils

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This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical. Map units that have very similar properties may have different interpretations for some uses because of slight differences in depth to a restrictive layer, differences in the thickest layer, or other differences.

## Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, *poor*, and *very poor*.

## Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

## Interpretive Groups

Interpretive groups are specified land use and specific management groupings that are assigned to soil areas because combinations of soils have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. These groups allow users of soil surveys to plan reasonable alternatives for the use and management of soils.

Table 29 shows the interpretive ratings for land capability classification; pasture and hayland suitability groups; prime farmland; and hydric condition for each soil in the survey area.

Land capability classification is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deterioration over a long period of time (26). The table shows the land capability class and subclass for each of the soils in Allen County. Additional information on land capability classification is provided under the heading "Land Capability Classification."

Pasture and hayland suitability groups are composed of soil map units having similar potentials and limitations for forage production. These groups simplify soils information and provide soil and plant science information for planning purposes. Additional information on pasture and hayland suitability groups is provided under the heading "Pasture and Hayland Interpretations."

The prime farmland classification identifies the most suitable land for producing food, feed, fiber, forage, and oilseed crops. This identification is useful in the management and maintenance of the resource base that supports the productive capacity of Ohio agriculture. The table shows which of the soils in Allen County are prime farmland. Additional information on prime farmland is provided under the heading "Prime Farmland."

The identification of hydric soils and information about hydrophytic vegetation and wetland hydrology are used to define wetlands. The table shows which of the soils in Allen County are hydric. Additional information on hydric soils is provided under the heading "Hydric Soils."

## Crops and Pasture

Brian Thomas, District Conservationist, Natural Resources Conservation District, assisted in the preparation of this section.

General management needed for crops, pasture, and hayland is suggested in this section. This section also discusses cropland limitations and hazards, pasture and hayland interpretations, the crop yield index, the system of land capability classification, and prime farmland.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.



**Figure 10.—Grassed filter strips in an area of Hoytville silty clay loam, 0 to 1 percent slopes. Filter strips along the shoulders of ditchbanks help to trap and remove soil particles before surface runoff enters adjacent waterways.**

## **Cropland Management**

Prime agricultural land is dispersed throughout the county. With good management practices, most soils are highly productive for crops and pasture. Major soil management concerns are based upon similarities and differences in soil properties and qualities associated with the different types of soil. The major soil management concerns are seasonal wetness (including ponded areas), erosion, soil structure damage (such as compaction, crusting, and clod formation), droughtiness, and soil fertility.

Seasonal wetness and ponding are the major management concerns on about 136,625 acres of land in the county. The very poorly drained Alvada, Hoytville, Millsdale, Patton, Pewamo, Rensselaer, Roundhead, Saranac, Sloan, and Westland soils are naturally so wet that crop production is generally not possible unless surface or subsurface drainage is installed. The somewhat poorly drained Aurand, Blount, Darroch, Nappanee, Shoals, Sleeth, and Tiderishi soils are naturally so wet that crops are damaged during most years and planting and harvesting is delayed unless artificial drainage is installed.

Small areas of wetter soils in seepy areas, along drainageways, and in swales are common inclusions in areas of the moderately well drained Cygnet, Flatrock, Glynwood, Harrod, Houcktown, Jenera, Medway, and Thackery soils. Random subsurface drainage systems are installed in these areas for maximum crop yields.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface and subsurface drainage is needed in many areas of the very poorly drained Alvada, Hoytville, Millsdale, Patton, Pewamo, Rensselaer, Roundhead, Saranac, Sloan, and Westland soils that are used for intensive crop production (fig. 10). Drains should be more closely spaced in soils that have slow or very slow permeability than in soils that have moderately slow permeability. Blount,

Hoytville, Nappanee, and Saranac soils are slowly permeable or very slowly permeable.

Establishing adequate outlets for subsurface drainage systems can be difficult in some areas of Alvada, Hoytville, Millsdale, Patton, Pewamo, Rensselaer, Roundhead, Saranac, Sloan, and Westland soils. Existing county and private drainage systems should be maintained as adequate outlets for present and future land uses. These systems often become outlets for basement and septic system curtain drains in many areas of Allen County. Urban construction activities can damage and disrupt these existing systems. As a result, renewed wetness and ponding of these previously drained cropland areas now impact homeowners' use of this land. Cooperation between the urban and agricultural communities is needed in order to maintain or improve these drainage systems.

Drainage is a major consideration in managing crops and pasture. Management of drainage in conformance with regulations influencing wetlands may require special permits and extra planning. Information about the design of drainage systems for each kind of soil is provided in the "Field Office Technical Guide," which is available at the local office of the Natural Resources Conservation Service or the Allen Soil and Water Conservation District.

Erosion by water is a major concern on about 101,028 acres of land in the county. On bare soils, erosion is generally a hazard where the slope is more than 2 percent. The hazard increases as the slope increases.

Erosion reduces natural soil fertility and productivity as the original topsoil is removed and the subsoil is incorporated into the surface layer through tillage. The need for applications of lime and fertilizer to replace lost plant nutrients and to maintain productivity is increased. If the amount of annual soil loss exceeds the rate at which new soil is formed, long-term productivity and natural fertility are affected. Loss of the original topsoil is of particular concern in areas of soils that have a high content of clay in the subsoil, such as Blount, Eldean, Glynwood, Lybrand, Nappanee, and Shinrock soils.

Erosion increases the cost of crop production, results in poor soil structure in the surface layer, and reduces the available water capacity of the surface layer. Tillage in preparation of a good seedbed requires more energy in eroded spots in many sloping fields. Lower plant populations result from inadequate soil-to-seed contact and a lower available water capacity. These more eroded spots are common in areas of Glynwood, Lybrand, and Shinrock soils.

Eroded soil particles with attached nutrients, herbicides, and pesticides enter drainageways, streams, rivers, ponds, lakes, and reservoirs. These sediments can fill drainage ditches and block subsurface drainage outlets. Sediment removal is the most costly part of ditch maintenance. Controlling erosion protects the soil resource base, maintains long-term productivity, reduces drainage maintenance costs, and improves water quality.

The classes for the "potential for surface runoff" listed in each detailed map unit description were calculated using the following rules (29). The soil surface is assumed to be bare, and surface water retention due to irregularities in the ground surface is low. In addition, a standardized antecedent water state condition prior to the water addition is assumed: the soil is conceived to be very moist or wet to the base of the soil, to  $\frac{1}{2}$  meter, or through the horizon or layer with minimum permeability within 1 meter, whichever is the greatest depth. If the minimum permeability of the soil occurs below 1 meter, it is disregarded and the minimum "to and including 1 meter" is employed.

Wind erosion is a problem on some soils in the county. Soils with a high sand content in the surface layer, such as Arkport and Seward soils, and soils with a muck surface layer, such as Roundhead soils, are particularly susceptible to this type of erosion. The abrasive action of windblown sand particles damages crops. Minimizing



**Figure 11.—Blount silt loam, 0 to 2 percent slopes, is well suited to no-till soybeans.**

tillage, avoiding fall plowing, and using cover crops can reduce the hazard of wind erosion. Sod strips and windbreaks can reduce the effects of wind velocity and particle abrasion on crops.

Management measures that control erosion include crop rotations, cover crops, crop residue management, water- and sediment-control basins (WASCOBs), grassed waterways, and conservation tillage. Also, plowing in the spring rather than in the fall helps to control erosion. Selecting management measures that conform to a particular cropping system helps to keep soil loss to an amount that will not reduce long-term productivity.

Crop rotations that include cover crops and grasses and legumes reduce the hazard of erosion by providing plant cover for extended periods. These rotations protect bare soil from the erosive forces of raindrop splash and water runoff. Increased water infiltration occurs as the soil structure of the surface layer is improved. The proportion of hay or pasture in the rotation should increase as the percent of slope increases.

A system of conservation tillage, including no-till planting (fig. 11), that leaves crop residue on the surface can help to control erosion on most of the soils in the county. Such a system is best suited to well drained and moderately well drained soils that dry and warm early in the spring. Installing surface and subsurface drainage systems on somewhat poorly drained and very poorly drained soils is necessary if conservation tillage systems are used. Water- and sediment-control basins can be used in place of grassed waterways on small watersheds. These basins are earth embankments, generally constructed across the slope of minor watercourses. This practice traps sediment and minimizes gully erosion. A high level of management, including weed and insect control, is also needed.

Soil structure damage in the surface layer is more commonly referred to as compaction, crusting, or clod formation.

Soil compaction is a general management concern on all of the cropland in the

county. Pressure applied to the land surface by farm machinery can cause compaction when the soil is soft and compressible because of wetness. As soil structural units are mashed and smeared, the pore space occupied by air and water within these structural units and between the structural units is reduced. Air and water movement into and out of the soil is also restricted, resulting in ponding of surface water. This ponding is especially noticeable at the ends of fields, where increased traffic occurs. Root penetration is restricted to the upper part of the subsoil. Lower crop yields are most noticeable at the ends of fields.

Factors that affect compaction on all soils regardless of use include machinery size, machinery weight and design (pounds of force per square inch of soil surface area), and type of farm implements (wheeled versus tracked).

In addition to compaction, soil texture and soil moisture content also affect crusting and clod formation. Crusting, or hardening of the bare soil surface, follows intense rainfall as soon as the surface layer starts to dry. Many of the soils in Allen County have a surface layer of silt loam or silty clay loam. A crust can form on these soils as the granular soil structure is destroyed by tillage. This crust must be broken before some crop seedlings can emerge, especially in areas that are continuously row cropped and where conventional tillage systems are used.

Clod formation, or hardening of the entire surface layer, occurs after tillage when the soil moisture content is too high. It is most noticeable in areas of soils that have a surface layer that has a high content of clay. Additional tillage is needed to break up these clods and to facilitate preparation of a good seedbed. Unless adequate rain is received soon after planting, lower plant populations result from inadequate soil-to-seed contact and inadequate amounts of available water.

Compaction, crusting, and clod formation can be minimized by tilling the soil at the proper soil moisture content. Less tillage results in less destruction of soil structure. No-till systems initially result in less pore space for air and water movement. After 2 or 3 years, new soil structural units are formed and pore space increases for air and water movement. More roots in the soil contribute to better soil structure. In addition, decreased tillage results in an increase in macropores (earthworm burrows) and an increase in the pore space of the soil. This condition is most noticeable in soils with long-term no-tillage management systems or permanent pasture or where grass is included in the hay part of the crop rotation.

Droughtiness refers to an insufficient amount of water available for good crop growth between rains. Some soils have a higher available water capacity than others. Droughty soils that are used as cropland or pasture in Allen County are Arkport, Eldean, Millsdale, Milton, and the strongly sloping or moderately steep Fox soils. Moderate depth to bedrock, stony or gravelly material in the lower part of the subsoil, severe erosion, or any combination of these soil properties and qualities results in a low available water capacity.

Many of the soils in which moisture shortages occur are well suited to a system of conservation tillage, such as no-till planting, that leaves crop residue on the surface.

The crop residue increases the moisture supply by increasing the rate of water infiltration and by reducing runoff and evaporation rates.

The fertility of a soil depends on the natural fertility level and on past use and management, including previous applications of lime and fertilizer. As a result, fertility can vary widely from field to field, even on the same kind of soil.

About 16 chemical elements are essential to the growth of plants. High crop yields and productive pastures require adequate levels of plant nutrients, lime, and organic matter. Maintaining these levels results in sustained high yields on all of the soils in the county.

Many nutrients are most readily available to plants where the soil is nearly neutral in reaction (pH). They are less readily available where the soil is more acid or more alkaline. Some soils, such as Arkport, are acid in the upper part of the root zone. In

these soils, periodic additions of lime are needed to increase the availability of plant nutrients.

Soil texture, organic matter content, and the type of clay minerals influence the cation-exchange capacity of the soil, which affects the storage and availability of nutrients. The ability to store and release plant nutrients increases as the content of clay and organic matter increases. Pewamo soils have a high content of clay and organic matter and a high capacity to store and release plant nutrients. Soils that have a lower content of clay or organic matter, such as Arkport soils, have a reduced capacity to store and release nutrients and lose more nutrients through leaching. On these soils, frequent applications of a small amount of fertilizer can compensate for the nutrients lost through leaching.

On all soils, additions of lime and fertilizer should be based on the results of soil tests and on crop needs for the expected level of yields. The Ohio State University Extension can help in determining the kinds and amounts of fertilizer and lime to be applied.

Organic matter influences many soil properties, including color, structure, tilth, rate of water infiltration, available water capacity, and cation-exchange capacity. In Allen County, soils that have a light-colored surface layer generally have a moderate or low content of organic matter in the surface layer. Soils that have a dark surface layer have a high content of organic matter. Cultivation tends to lower the organic matter content by increasing the rates of oxidation and erosion on sloping soils. Returning all crop residue to the soil helps to maintain the organic matter content. Cover crops, sod crops, green manure crops, and additions of manure increase the organic matter content.

Sewage sludge can have economic value as a source of organic matter and some plant nutrients. If the sludge is applied to land, management concerns include the application rate, the hazards associated with heavy metals, possible odor problems, and health hazards. The chemical composition of the sludge should be determined before the sludge is applied. Additions of sludge to cropland should be based on analysis of the sludge, the results of soil tests, and the expected level of crop yields. The Ohio State University Extension can provide information about the application of sewage sludge.

## **Cropland Limitations and Hazards**

The management concerns affecting the use of the detailed map units in the survey area for crops are shown in table 5. The main concerns affecting the management of nonirrigated cropland are controlling flooding, soil blowing, and water erosion; preventing ground-water pollution; removing excess water; minimizing surface crusting; reducing compaction; and maintaining soil tilth, organic matter, and fertility.

Generally, a combination of several practices is needed to control soil blowing and water erosion. Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Surface or subsurface drainage or both are used to remove excess water, lower the seasonal high water table, and minimize ponding.

A surface crust forms in tilled areas after hard rains and may inhibit seedling emergence. Regular additions of crop residue, manure, or other organic materials help to improve soil structure and minimize crusting.

Tilling within the proper range in moisture content minimizes surface compaction.

Measures that are effective in maintaining soil tilth, organic matter, and fertility include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and

thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *flooding*, *ponding*, *slope*, *limited organic matter content*, and *depth to bedrock*.

*Flooding*.—Flooding can damage winter grain and forage crops. A tillage method that partly covers crop residue and leaves a rough or ridged surface helps to prevent removal of crop residue by floodwater. Tilling and planting should be delayed in the spring until flooding is no longer a hazard.

*Ponding*.—Surface drains help to remove excess surface water and minimize damage from ponding.

*Slope*.—Where the slope is more than 25 percent, water erosion is excessive. The selection of crops and use of equipment are limited. Cultivation may be restricted.

*Limited organic matter content*.—Many soils that have a light-colored surface layer have a low or moderately low organic matter content and weak or moderate structure. Regularly adding crop residue, manure, and other organic material to the soil maintains or improves the content of organic matter and soil structure.

*Depth to bedrock*.—Rooting depth and available moisture may be limited by bedrock within a depth of 40 inches.

Additional limitations and hazards are as follows:

*Potential for ground-water pollution*.—This is a hazard in soils that have excessive permeability, are moderately deep or shallow to bedrock, or have a high water table.

*Limited available water capacity, poor tilth, restricted permeability, and surface crusting*.—These limitations can be overcome by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems.

*Frost action*.—Frost action can damage deep-rooted legumes and some small grains.

*Sandy layers*.—Deep leaching of nutrients and pesticides may occur in sandy layers. Crops generally respond better to smaller, more frequent applications of fertilizer and lime than to one large application.

*Clodding*.—Clods may inhibit germination, reduce water infiltration, and increase runoff.

*Subsidence of muck*.—Subsidence or shrinking occurs as a result of oxidation in the muck after the soil is drained. Control of the water table by subirrigation through subsurface drain lines reduces the hazards of subsidence, burning, and soil blowing.

*High clay content*.—The high clay content in the soil reduces rooting depth and water movement.

*Root-restrictive layers*.—Root-restrictive layers limit root growth and water movement.

*Excessive alkalinity*.—A high pH in the upper part of the soil may inhibit plant growth and reduce availability of potassium and micronutrients.

*Excessive acidity*.—A low pH in the upper part of the soil may increase concentrations of aluminum and manganese and may harm plants.

*Gravelly surface*.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

*Stony surface*.—Stones or boulders on the surface can hinder normal tillage unless they are removed.

The following is an explanation of the criteria used to determine the limitations or hazards for cropland:

*Areas of rock outcrop*.—Rock outcrop is a named component of the map unit.

*Areas of rubble land*.—Rubble land is a named component of the map unit.

*Areas of slick spots*.—Slick spots are a named component of the map unit.

*Channeled.*—The word “channeled” is included in the name of the map unit.

*Easily eroded.*—The surface K factor multiplied by the relative value of the slope is more than 2 (same as prime farmland criteria).

*Erosion hazard.*—The relative value of the slope is greater than 2.

*Frequent flooding.*—The component of the map unit is frequently flooded.

*Occasional flooding.*—The component of the map unit is occasionally flooded.

*Gullied.*—The word “gullied” is included in the name of the map unit.

*Lack of timely precipitation.*—The component of the map unit has a Xeric moisture regime. The amount of annual precipitation is no more than 14 inches.

*Lime content.*—The component is assigned to wind erodibility group 4L or has more than 5 percent lime in the upper 10 inches.

*Limited available water capacity.*—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

*Ponding.*—Ponding duration is assigned to the component of the map unit.

*Ponded for extended periods.*—A ponding duration of very long is assigned to the component of the map unit.

*Gravelly surface.*—The surface texture has a flaggy, very flaggy, extremely flaggy, very gravelly, extremely gravelly, or very channery modifier.

*Stony surface.*—The surface texture has a bouldery, very bouldery, extremely bouldery, stony, very stony, extremely stony, cobbly, very cobbly, or extremely cobbly modifier.

*Sandy layers.*—The family particle size is sandy, sandy or sandy-skeletal, sandy over loamy, sandy over clayey, sandy-skeletal, sandy-skeletal over clayey, or sandy-skeletal over loamy; the subgroup is Arenic or Psammentic; or the suborder is Psamments.

*Depth to bedrock.*—Bedrock is at a depth of less than 40 inches.

*High potential for ground-water pollution.*—Hard bedrock is within a depth of 40 inches, or permeability is more than 6 inches per hour in some layer within a depth of 80 inches and is not 0.2 inch per hour or less within that depth.

*Moderate potential for ground-water pollution.*—An apparent water table is within a depth of 4 feet, or permeability is moderately rapid in some layer between depths of 24 and 60 inches and is not 0.2 inch per hour or less in some layer within a depth of 80 inches.

*Poor tilth.*—The component of the map unit is severely eroded, has less than 1 percent organic matter in the surface layer, or has 35 percent or more clay in the surface layer.

*Fair tilth.*—The component of the map unit has a surface layer of silty clay loam or clay loam and has less than 35 percent clay, or it is moderately eroded and has a surface layer of silt loam or loam.

*Excessive acidity.*—The upper range of the soil pH is less than 4.5 within a depth of 40 inches.

*Excessive alkalinity.*—The lower range of the soil pH is 7.9 or more within a depth of 40 inches.

*Restricted permeability.*—Permeability is 0.06 inch per hour or less within a depth of 40 inches, and a seasonal high water table is within a depth of 18 inches.

*Seasonal high water table.*—The seasonal high water table is within a depth of 1.5 feet.

*Salt content.*—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

*Short frost-free season.*—The map unit has a growing season of less than 90 frost-free days.

*Excessive slope.*—The upper slope range of the component of the map unit is more than 25 percent.

*Sodium content.*—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

*Soil blowing.*—The wind erodibility index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

*Surface crusting.*—The organic matter content of the surface layer is less than or equal to 3 percent, and the texture is silt loam or silty clay loam.

*Surface compaction.*—The component of the map unit has a surface layer of silt loam, silty clay loam, clay loam, clay, or silty clay.

*Frost action.*—The component of the map unit has a high potential for frost action.

*Part of surface removed.*—The surface layer of the component of the map unit is moderately eroded.

*Most of surface removed.*—The surface layer of the component of the map unit is severely eroded.

*Subsidence of muck.*—The organic matter content of the surface layer of the component of the map unit is greater than or equal to 20 percent.

*Wind erosion.*—The upper range of the slope is less than or equal to 25 percent, and the wind erodibility group is 1, 2, or 3.

*Clodding.*—The relative value of the total clay in the surface layer is greater than 32 percent.

*Root-restrictive layer.*—A fragipan or dense material is within a depth of 40 inches.

*High clay content.*—A layer within a depth of 40 inches has a clay content that averages between 40 and 60 percent.

*Very high clay content.*—A layer within a depth of 40 inches has a clay content that averages more than 60 percent.

## Pasture and Hayland Management

Some of the acreage in Allen County is used as pasture and hayland. The more common pasture and hay plants are alfalfa, red clover, alsike clover, bluegrass, orchardgrass, tall fescue, ladino, timothy, and brome grass. Pastures are commonly in areas of soils that have severe limitations affecting row crops. Soils on the steeper slopes, such as Fox and Lybrand soils, are commonly used for pasture.

The ability of a pasture to produce forage and to provide enough cover for erosion control is influenced by the number of livestock, the length of the period of grazing, the timeliness of grazing, the type of forage being grazed, and the availability of water. Good management measures, such as proper stocking rates, pasture rotation, timely deferment of grazing, applications of lime and fertilizer, and control of weeds and insects, help to maintain the key forage plants. Maintaining soil fertility and mowing help to control weeds. The need for applications of lime and fertilizer should be determined by soil tests. The amount of nutrients to be applied should be based on the requirements of the grasses or legumes to be grown.

Erosion control is a management need on gently sloping to very steep soils that are used for pasture. The hazard of erosion increases as the slope increases. Many of these soils are already eroded. Control of erosion is particularly important when the pasture is seeded. Using a no-till seeding method or growing small grain as a companion crop can help to control further erosion.

Soil compaction is caused by overgrazing or grazing when the soils are wet. It can greatly reduce the vigor of pasture plants. Also, it can increase the runoff rate and the hazard of erosion on sloping soils. Deferment of grazing during wet periods minimizes compaction. Subsurface drains can be effective in removing excess water from pastured areas of soils that are very poorly drained or somewhat poorly drained.

Seeding mixtures should be selected on the basis of soil type and the desired management system. Legumes increase the nutrient value of the forage and provide

nitrogen for the growth of grasses. Alfalfa should be seeded on well drained soils that have adequate levels of plant nutrients and lime. The wetter soils are better suited to alsike clover than to red clover or to alfalfa. Information about seeding mixtures, herbicide treatment, and other management measures for specific soils can be obtained from the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

## **Pasture and Hayland Interpretations**

Soils are assigned to pasture and hayland groups according to their suitability for the production of forage. The soils in each group are similar enough to be suited to the same species of grasses or legumes, have similar limitations and hazards, require similar management, and have similar productivity levels and other responses to management.

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

Yield estimates are often provided in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 29 lists the pasture and hayland suitability group symbol for each soil. Soils assigned the same suitability group symbol require the same general management and have about the same potential productivity. The pasture and hayland suitability groups are based on soil characteristics and limitations.

Soils assigned to group A have few limitations for the management and growth of climatically adapted plants. Those assigned to group A-1 are very deep and well drained or moderately well drained. They have a surface layer of silty clay loam, silt loam, loamy fine sand, or loam. The available water capacity ranges from moderate to very high. These soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. A low pH in the subsoil can shorten the life of some deep-rooted legumes. Slopes range from 0 to 12 percent.

Soils in group A-3 are deep or very deep and are well drained or moderately well drained. They have a surface layer of silt loam. Slopes range from 20 to 55 percent. These soils are generally not recommended for use as pasture and hayland because of the slope.

Soils in group A-5 are very deep and are well drained or moderately well drained. They are occasionally flooded. Flooding limits these soils for pasture during periods of stream overflow, and sediment lowers the quality of the forage. These soils have a surface layer of silt loam. The available water capacity is moderate or high. Slopes range from 0 to 2 percent.

Soils in group A-6 are very deep, moderately well drained, and subject to frost action. Frost action can damage legume stands. Mixing fibrous-rooted grasses with legumes and proper grazing management help to reduce the damage from frost action. These soils have a surface layer of silt loam, loam, fine sandy loam, sandy loam, clay loam, or silty clay loam. The available water capacity is moderate or high. Slopes range from 0 to 12 percent.

Soils in group B have limited potential for forage growth and production because of droughtiness. Those assigned to group B-1 are very deep and well drained or moderately well drained. They have a surface layer of loam, silt loam, or loamy fine sand. The available water capacity is low. These soils are sandy, clayey, or loamy in the subsoil. Slopes range from 1 to 18 percent.

Soils in group B-3 are moderately deep and somewhat poorly drained soils. They are subject to frequent flooding. Flooding limits these soils for pasture during periods

of stream overflow, and sediment lowers the quality of the forage. These soils have a surface layer of silt loam. Slopes range from 0 to 1 percent.

Soils in group C are wet due to a seasonal high water table. Those assigned to group C-1 are very deep and somewhat poorly drained to very poorly drained. These soils have a surface layer of silt loam, silty clay loam, clay loam, or loam. The available water capacity ranges from low to high. These soils normally respond well to subsurface drainage. Slopes range from 0 to 4 percent.

Soils in group C-2 are moderately deep to very deep and very poorly drained. They have a surface layer of silty clay loam or clay loam. The available water capacity is low to high. A high seasonal water table limits the rooting depth of deep-rooted forage plants. Some of the soils have bedrock, which also restricts rooting. These soils are best suited to shallow-rooted species. Subsurface drains are used to lower the seasonal high water table. The effectiveness of subsurface drainage is usually limited by the permeability of the subsoil, depth to bedrock, or landscape position. These soils are better suited to forages that do not have a tap root because of the limited root zone. Some of the soils are rarely flooded. Slopes are 0 to 1 percent.

Soils in group C-3 are very deep and very poorly drained or somewhat poorly drained. They are occasionally or frequently flooded. Flooding limits these soils for pasture during periods of stream overflow, and sediment lowers the quality of the forage. These soils have a surface layer of silt loam or silty clay loam. The available water capacity is high. Slopes are 0 to 1 percent. Frost action may damage legumes. Including grasses in a seeding mixture and proper grazing management reduce the damage from frost heaving. A seasonal high water table limits the rooting depth of forage plants. These soils are best suited to shallow-rooted species. Subsurface drains are used to lower the seasonal high water table. The effectiveness of subsurface drainage is limited by the landscape position.

Soils in group D are organic soils. Those assigned to group D-1 are very deep and very poorly drained. They formed in organic material that is underlain by stratified deposits. The available water capacity is very high. Slopes are 0 to 1 percent.

Soils in group F have restricted root growth of climatically adapted plants to a depth of 20 to 40 inches. These soils are better suited to forages that do not have a tap root because of the moderately deep root zone. Those assigned to group F-1 are moderately deep and moderately well drained. They have a loam surface layer. The available water capacity is low. These soils are droughty and are suited to warm-season grasses, such as switchgrass, big bluestem, indiangrass, and Caucasian bluestem. These soils respond favorably to additions of lime. Frequent applications of lime may be needed to maintain an adequate pH level. The low pH of the subsoil of some of the soils shortens the life of some deep-rooted legumes. Slopes range from 0 to 2 percent.

The local office of the Natural Resources Conservation Service or the Ohio State University Extension can provide information about forage yields.

## Crop Yield Index

Table 6 lists the crop yield indices for Allen County. The yield index reflects the yield potential of a soil in relation to other soils in the county. It is based on the most productive soil—Rensselaer loam, 0 to 1 percent slopes. This soil receives a rating of 100. Other soils are ranked against this standard.

The yields used to calculate the index values are based on using good management practices.

To calculate estimated yields, use the yield index number as a percentage and multiply it by the crop yield in the table header. For example, to calculate estimated corn yield for map unit AkA, multiply .87 by the corn yield in the

header, which is 192. Therefore,  $.87 \times 192 = 167$  bushels of corn estimated for map unit AkA.

To use this yield index in the future to calculate estimated yields, use current yield data.

Additional information on calculating estimated yields can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

## Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In Allen County, soils in the capability system are grouped at two levels—capability class and subclass.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, woodland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, woodland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, woodland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in table 7. The

capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in table 29.

## Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, woodland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 238,000 acres in the county, or about 91 percent of the total acreage in the county, meets the soil requirements for prime farmland as defined by the Natural Resources Conservation Service. Allen County consists of dominantly prime farmland soils; however, small areas of soils that do not meet the requirements for prime farmland are scattered throughout the county.

Most of the prime farmland in the county is used as cropland. Urbanization in and around the cities of Lima, Delphos, and Bluffton and along the Interstate 75 corridor account for the majority of prime farmland lost from agricultural uses.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 8. They are also identified in table 29. These lists do not constitute a recommendation for a particular land use. On some soils included in the lists, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed.

Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

## Unique Farmland

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil qualities, location, growing season, and moisture supply needed for the economic production of sustained high yields of a specific high-quality crop when treated and managed by

acceptable farming methods. Examples of such crops are tree fruits, berries, and vegetables.

Unique farmland has an adequate supply of available moisture for the specific crops for which it is used because of stored moisture, precipitation, or irrigation and has a combination of soil qualities, growing season, temperature, humidity, air drainage, elevation, aspect, and other factors, such as nearness to markets, that favors the production of a specific food or fiber crop.

Lists of unique farmland are developed as needed in cooperation with conservation districts and others.

### **Additional Farmland of Statewide Importance**

Some areas other than areas of prime farmland and unique farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by the appropriate State agency or agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some States additional farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

### **Additional Farmland of Local Importance**

This land consists of areas that are of local importance in the production of food, feed, fiber, forage, and oilseed crops and are not identified as having national or statewide importance. Where appropriate, this land is identified by local agencies. It may include tracts of land that have been designated for agriculture by local ordinance.

Lists of this land are developed as needed in cooperation with conservation districts and others.

## **Hydric Soils**

In this section, hydric soils are defined and described. The hydric soils in the survey area are listed in table 9 and also identified in table 29.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (4, 13, 20). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (5). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (6). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (27) and "Keys to Soil Taxonomy" (23) and in the "Soil Survey Manual" (29).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible

properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (12).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

The map units in table 9 meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (12, 13).

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The map units in table 10, in general, do not meet the definition of hydric soils because they do not have one of the hydric soil indicators. A portion of these map units, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

## Woodland Management and Productivity

Michael Jurkiewicz, Service Forester, Ohio Department of Natural Resources, Division of Forestry, helped prepare this section.

Nearly all of Allen County was forested at the time of the earliest land surveys. The climax forest community was dominantly beech forest in most of the county. The northern part of the county is within the Great Black Swamp Region of Ohio. This area was characterized by an elm-ash swamp forest community. Scattered remnants of other native plant communities exist in the county. These include the mixed oak forest community and the marshes and fens community (11).

In 1997, about 28,400 acres, or about 11 percent of the county, remained in woodland (25). Most of this acreage is in small scattered woodlots on slopes along stream valleys, on flood plains, and in isolated tracts on uplands. Most of the woodland has been cut over, and much of it has been grazed.

The return from the sale of wood products is smaller than that from the sale of other farm products on individual farms. If timber is competitively bid out, however, the maximum profit can be realized because of increased demand and changing markets for a variety of native hardwoods. The demand for high-quality oak and walnut is relatively stable, but new markets, such as elm veneer, are developing. The potential for increased production of timber is high. If managed well, woodlots are capable of producing high-quality, rapidly growing native hardwoods. Woodlots also provide firewood, lumber, edible nuts, wildlife habitat, esthetic value, and protection from winds.

Some of the woodland areas in the county need some type of conservation treatment. Livestock grazing in the woodland and inadequate timber management are the major concerns. Stand improvement practices, such as culling diseased trees and the less desirable trees and cutting and spraying grapevines, improve the growth rate of favored species. Harvesting mature trees reduces competition from the less desirable trees and helps to prevent disease. When species are selected for planting

on open ground, the slope and the type of soil should be considered. Planting is seldom necessary in established woods. Fencing livestock out of the woods and providing fire protection help to maintain good stands.

The soil properties at a specific site influence woodland management. The survival rates of seedling species, windthrow hazard, equipment limitations, and erosion potentials are management concerns that are influenced by the soil type. The water-holding capacity and internal drainage affect plant competition and seedling mortality. Surface texture, organic matter content, slope, and drainage influence logging schedules, equipment limitations, and damage sustained to the woodland environment during logging. Depth to the seasonal high water table or bedrock influence rooting depth, which affects windthrow and site productivity.

Soil type and plant species are related. Soils that are susceptible to ponding for part of the year commonly support stands of red maple, green ash, eastern cottonwood, swamp white oak, and pin oak. The somewhat poorly drained, poorly drained, and very poorly drained soils are best suited to hydrophytic species, such as American sycamore, swamp white oak, eastern cottonwood, American basswood, and pin oak. Moderately well drained and well drained soils support a greater variety of tree species, such as eastern white pine, northern red oak, white oak, white ash, shagbark hickory, black walnut, tuliptree, sugar maple, and black cherry.

Information on woodland management is available from the Ohio Department of Natural Resources, Division of Forestry; the Ohio State University Extension; and the Natural Resources Conservation Service.

The tables in this section can help woodland owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of woodland management.

## Woodland Management

In tables 11, 12, and 13, interpretive ratings are given for various aspects of woodland management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified woodland management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified woodland management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low*, *moderate*, and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.01).

The paragraphs that follow indicate the soil properties considered in rating the soils

for woodland management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual" (22), which is available at the local office of the Natural Resources Conservation Service.

Ratings in the column *erosion hazard* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of woodland equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

For *limitations affecting construction of haul roads and log landings*, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

Ratings in the column *harvest equipment operability* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

Ratings in the column *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for site preparation* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer,

thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

## Woodland Productivity

In table 14, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available at the local office of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

*Trees to manage* are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

## Windbreaks and Environmental Plantings

Greg Maxfield, District Forester, Ohio Department of Natural Resources, Division of Forestry, helped prepare this section.

In Allen County, the importance of field windbreaks and environmental plantings is increasing. Arkport, Roundhead, and Seward soils are susceptible to wind erosion. These soils can be severely affected by southwesterly winds in the spring. As a result, newly planted seeds may be left uncovered and small plants are damaged by blowing sand. Properly designed field windbreaks also reduce the amount of windblown soil that reaches drainage ditches on the farm.

Farm and homestead windbreaks are rows of trees or shrubs established adjacent to farm buildings, feedlots, and homes. These windbreaks are usually planted perpendicular to the prevailing winter wind. Planting multiple rows of various species provides the best protection from winds and results in more varied wildlife habitat.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 15 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 15 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service, the Ohio Department of Natural Resources, Division of Forestry, or the Cooperative Extension Service or from a commercial nursery.

## Recreational Development

Allen County has more recreational opportunities than many counties in northwestern Ohio. The Johnny Appleseed Metropolitan Park District has a network of parks throughout the county, including a canoe livery on the Auglaize River. The Auglaize and Ottawa Rivers and five large reservoirs are the basis for water-related recreational activities. Private camping, swimming, and sportsmen clubs provide opportunities for a wide range of outdoor activities.

Lima has several city parks and recreational facilities available for use by the public. There are also numerous village parks and schools throughout the county which provide athletic fields, swimming pools, playground equipment, tennis courts, and shelter houses. In addition, the county has several public and private golf courses.

The soils of the survey area are rated in table 16, parts I and II, according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the table are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in table 16 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

*Camp areas* require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones.

The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Playgrounds* require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Paths and trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

## Wildlife Habitat

Jeff Burris, Wildlife Technician, Ohio Department of Natural Resources, Division of Wildlife, helped prepare this section.

The abundance and diversity of wildlife have declined in the intensively farmed counties in northwestern Ohio. As farmers have mechanized their operations and as the acreage of corn and soybeans has increased, there are fewer acres of diversified crops, fence rows, and streambanks lined with woody vegetation. Such areas provide good habitat for wildlife. Fall plowing of cropland destroys the food and cover needed by wildlife to survive the winter. Suitable habitat is the single most important factor determining the existence of a diverse wildlife population. The types of wildlife habitat that occur in Allen County include wetland, grassland, woodland, cropland, and riparian habitat.

Wetland habitat offers shelter for migratory waterfowl, shore birds, songbirds, amphibians, reptiles, and mammals. Wetlands also support invertebrates and plants that are important foods for game and non-game species. These wetlands also act as pollution filters and floodwater storage basins and provide erosion control.

Grassland habitat generally provides valuable nesting cover. It also furnishes food in the form of seeds and succulent green plants.

Woodland habitat in the county has been altered by conversion to cropland, overgrazing, residential and industrial development, and commercial timber harvest. Forestland in the county consists of small woodland "islands" and occur as corridors along streams. These corridors and islands are surrounded by large expanses of cropland.

Cropland habitat is seasonal and is therefore transitory in nature. Cropland provides some food and shelter for wildlife. Moldboard plowing reduces the amount of quality habitat available for resident species. More and more cropland is being cultivated by the no-till method, which leaves crop residue on the soil surface. The crop residue provides shelter and some food for wildlife during the winter months. Fence rows along field boundaries also provide shelter for wildlife species. Marginal cropland that has been converted to wildlife habitat under provisions of the 1985 Farm Bill has increased the amount of available habitat for game and non-game species.

Stream corridors or riparian habitat consists of the land and corresponding vegetation along the banks of a watercourse. Riparian habitat is one of the richest and most diverse habitat types in Allen County. Riparian buffer zones provide many important benefits. They help to maintain high water quality and improve the habitat for a diverse population of wildlife. The quality of streams and rivers has declined because their natural characteristics have been altered. Tillage and drainage of the land combined with the loss of forested buffer zones have caused watercourses to become wider, shallower, and more turbid.

If they are properly managed, all of the soils in Allen County can provide the habitat elements needed for wildlife. Incorporating the principles of openland, wetland, and woodland wildlife habitat into current agricultural practices can increase the quantity and quality of wildlife habitat in the county. Additional information about the development of wildlife habitat can be obtained from the local game protector or from the local office of the Ohio State University Extension or the Natural Resources Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting the appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 17, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, brome grass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are Queen Anne's lace, goldenrod, common teasel, lambsquarters, and yarrow.

*Hardwood trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and raspberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

*Coniferous plants* furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, and mink.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, agricultural waste management, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

## Construction Materials

Table 18, parts I and II, give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

*Sand and gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the likelihood of finding material in suitable

quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. The thickest layer is the thickest layer above the bottom layer. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good*, *fair*, or *poor* as potential sources of reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the table. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

*Reclamation material* is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

## Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 19, parts I and II, show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Dwellings* are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Small commercial buildings* are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel,

crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

## Sanitary Facilities

Table 20, parts I and II, show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence

interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil

from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

## **Agricultural Waste Management**

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 21 shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings are both verbal and numerical. Rating class terms indicate the extent to

which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Application of manure and food-processing waste* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

*Application of sewage sludge* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor

K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

*Disposal of wastewater by irrigation* not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

## Water Management

Table 22, parts I and II, give information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; aquifer-fed excavated ponds; grassed waterways; terraces and diversions; and drainage. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Pond reservoir areas* hold water behind a dam or embankment (fig. 12). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.



**Figure 12.—Glynwood soils are good sites for pond reservoirs.**

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

*Constructing grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of water erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

*Constructing terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Drainage* is the removal of excess surface and subsurface water from the soil. How

easily and effectively the soil is drained depends on the depth to bedrock, a cemented pan, or other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.



# Soil Properties

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Data relating to soil properties are collected during the course of the soil survey. Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics. These results are on file at the School of Natural Resources, Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the State Office, Natural Resources Conservation Service, Columbus, Ohio.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

## Engineering Index Properties

Table 23 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 13). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the Unified soil classification system (2) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the

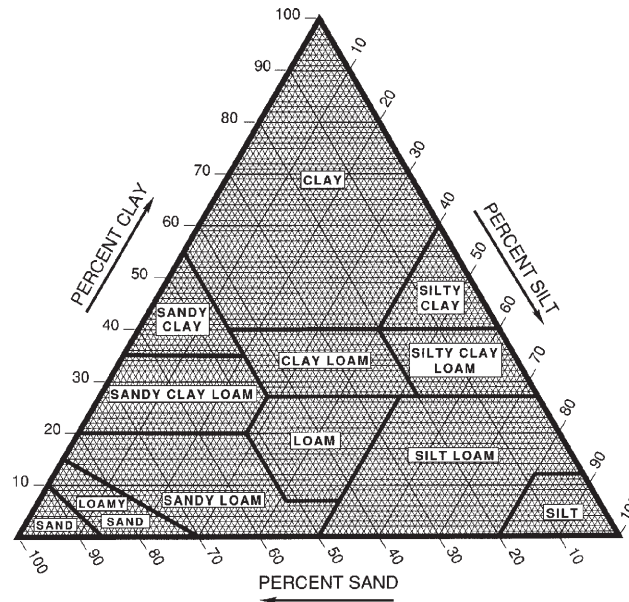


Figure 13.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit* and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

## Physical Properties

Table 24 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area.

The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 24, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at  $1/3$ - or  $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Permeability* refers to the ability of a soil to transmit water or air. The estimates in the table indicate the rate of water movement, in inches per hour (in/hr), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Shrink-swell potential* is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, 6 to 9 percent; and *very high*, more than 9 percent.

*Erosion factors* are shown in table 24 as the K factor ( $K_w$  and  $K_f$ ) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor  $K_w$*  indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor  $K_f$*  indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

## Chemical Properties

Table 25 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Soil reaction* is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 25, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Cation-exchange capacity* is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

*Calcium carbonate equivalent* is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

## Water Features

Table 26 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. Table 26 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Also indicated in the table is the *kind* of water table—that is, apparent or perched. An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is

installed, the water is removed only by percolation, transpiration, or evaporation. Table 26 indicates *surface water depth* and the *duration* and *frequency* of ponding. Ponding data in the table reflects drained conditions. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

## Soil Features

Table 27 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock (lithic), dense material, and frozen layers.

*Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Subsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

*Potential for frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent

collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

## Physical and Chemical Analyses of Selected Soils

Many of the soils in Allen County were sampled by the Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio. The physical and chemical data obtained from the samples include particle-size distribution, reaction, organic matter content, calcium carbonate content, and extractable cations.

These data were used in classifying and correlating soils and in evaluating their behavior under various land uses. Two pedons were selected as representative of the respective series and are described in the section "Soil Series and Their Morphology." These series and their laboratory identification numbers are AL-128 (Cygnet) and AL-127 (Harrod).

In addition to the data from Allen County, laboratory data are available from nearby or adjacent counties that have many of the same soils. These datasets and the data from Allen County are on file at the School of Natural Resources, Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the State Office, Natural Resources Conservation Service, Columbus, Ohio.

## Engineering Index Test Data

Engineering index test data are available for several pedons in Allen County. Additional engineering index test data is also available from several nearby counties that have many of the same soils as Allen County. These soils were analyzed for engineering properties by the Ohio Department of Transportation, Division of Highways, Bureau of Testing, Soils and Foundation Section. The available test data are on file at the MLRA Project Office, Findlay, Ohio; the School of Natural Resources, Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the State Office, Natural Resources Conservation Service, Columbus, Ohio.



# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (23, 27). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 28 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**ORDER.** Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

**SUBORDER.** Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, active, mesic Typic Hapludalfs.

**SERIES.** The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each

series. A pedon, a small three-dimensional area of soil that is typical of the series in the survey area is described. Pedons used in this publication were primarily described and documented as part of the Allen County modernization process. In certain circumstances, pedons from adjacent survey areas or from the site of the official series description were utilized. In most cases, typical pedons from adjacent survey areas were used to provide consistent supporting data and documentation across survey area boundaries.

The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (29). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (27) and in "Keys to Soil Taxonomy" (23). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

## ***Alvada Series***

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Loamy and gravelly deposits overlying till

*Landform:* Flats, depressions, and drainageways on lake plains and deltas on lake plains, outwash plains, and ground moraines

*Slope range:* 0 to 1 percent

*Adjacent soils:* Aurand, Cygnet, Houcktown, and Shawtown

*Taxonomic class:* Fine-loamy, mixed, active, mesic Typic Argiaquolls

### **Typical Pedon**

Alvada loam, 0 to 1 percent slopes; in Hancock County, Ohio; about 4.5 miles east of Findlay; Marion Township; about 200 feet north and 760 feet west of the southeast corner of sec. 14, T. 1 N., R. 11 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine roots; 3 percent rock fragments; neutral; clear smooth boundary.

Btg1—10 to 16 inches; dark gray (10YR 4/1) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common faint dark gray (10YR 4/1) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; few fine and medium prominent strong brown (7.5YR 5/6) and common fine and medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 3 percent rock fragments; neutral; gradual wavy boundary.

Btg2—16 to 21 inches; gray (10YR 5/1) clay loam; moderate medium subangular blocky structure; firm; few fine roots; common faint dark gray (10YR 4/1) clay films on faces of peds; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium prominent strong brown (7.5YR 5/6) and common fine and medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.

Btg3—21 to 28 inches; grayish brown (10YR 5/2) clay loam; moderate medium subangular blocky structure; friable; few fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium prominent strong brown (7.5YR 5/6) and common fine and medium distinct dark yellowish

brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 4 percent rock fragments; neutral; gradual wavy boundary.

Bt—28 to 39 inches; brown (10YR 5/3) loam that has thin strata of sandy loam; weak medium subangular blocky structure; friable; few fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; common medium and coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; few fine and medium prominent strong brown (7.5YR 5/6) and common medium and coarse faint dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 10 percent rock fragments; slightly effervescent; slightly alkaline; abrupt irregular boundary.

Btg—39 to 46 inches; grayish brown (10YR 5/2) gravelly loam that has thin strata of fine sandy loam and strata of silty clay loam; weak medium and coarse subangular blocky structure; friable; few fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds and as bridging between sand grains; few medium prominent strong brown (7.5YR 5/6) and common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; 20 percent rock fragments; strongly effervescent; slightly alkaline; abrupt wavy boundary.

BCg—46 to 50 inches; gray (10YR 5/1) very gravelly sandy loam; weak medium and coarse subangular blocky structure; very friable; few medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 35 percent rock fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.

2C—50 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive with widely spaced vertical fractures; firm; few medium distinct grayish brown (10YR 5/2) iron depletions oriented along fractures; 5 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 15 inches

*Thickness of the solum:* 35 to 55 inches

*Depth to carbonates:* 24 to 55 inches

*Depth to till:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—horizon has hue of 10YR or 2.5Y or is neutral in hue, has value of 2 or 3, and has chroma of 0 to 2

Texture—loam or silty clay loam

Content of rock fragments—0 to 10 percent

#### *Btg and Bt horizons:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2; chroma of 3 is included in the lower part of horizon

Texture—clay loam, loam, sandy clay loam, or silty clay loam or the gravelly analogues of those textures

Content of rock fragments—2 to 25 percent

#### *2C or 2Cg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 1 to 6

Texture—clay loam, silty clay loam, or loam

Content of rock fragments—1 to 7 percent

## Arkport Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material:* Sandy eolian deposits

*Landform:* Dunes on deltas on lake plains and beach ridges on lake plains

*Position on the landform:* Backslopes, shoulders, and summits

*Slope range:* 2 to 6 percent

*Adjacent soils:* Rensselaer and Seward

*Taxonomic class:* Coarse-loamy, mixed, active, mesic Lamellic Hapludalfs (fig. 14)

### Typical Pedon

Arkport loamy fine sand, 2 to 6 percent slopes; in Allen County, Ohio; about 4 miles west of Bluffton; Richland Township; about 250 feet west and 940 feet north of the southeast corner of sec. 6, T. 2 S., R. 8 E.

Ap—0 to 10 inches; dark brown (10YR 3/3) loamy fine sand, light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable; common very fine roots; few fine distinct black (10YR 2/1) moderately cemented manganese oxide concretions throughout; slightly acid; abrupt wavy boundary.

BE—10 to 18 inches; brown (10YR 5/3) loamy fine sand; weak medium subangular blocky structure; very friable; few very fine roots; few distinct dark grayish brown (10YR 4/2) organic coatings bridging sand grains; few fine distinct black (10YR 2/1) moderately cemented manganese oxide concretions throughout; neutral; abrupt wavy boundary.

E and Bt—18 to 65 inches; light yellowish brown (10YR 6/4) loamy fine sand (E material) intricately patterned with dark yellowish brown (10YR 4/4) fine sandy loam lamellae (Bt material) that are roughly horizontal in orientation; individual lamellae and bands range from  $\frac{1}{8}$  inch to 6 inches thick, with total lamellae thickness in the horizon of about 16 inches; weak coarse subangular blocky structure parting to weak fine granular in the E material; moderate coarse subangular blocky structure parting to moderate fine and medium angular in the Bt material; very friable; few very fine roots; neutral; clear wavy boundary.

C1—65 to 84 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; very few very fine roots; few medium and coarse distinct light gray (10YR 7/2) calcium carbonate concretions in the matrix; strongly effervescent; slightly alkaline; gradual smooth boundary.

C2—84 to 100 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to the uppermost lamellae:* 9 to 30 inches

*Thickness of the solum:* 40 to 100 inches

*Depth to carbonates:* 36 to 120 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3

Texture—loamy fine sand

*BE horizon:*

Color—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6

Texture—loamy fine sand



Figure 14.—Profile of an Arkport soil. The dark yellowish brown lamellae (banding) in the subsoil are a horizontal accumulation of clay. Depth is marked in feet. (Photo from Hancock County, Ohio)

*E and Bt horizon:*

Color of E part—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4

Color of Bt part—hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 6

Texture of E part—loamy fine sand, fine sand, or loamy very fine sand

Texture of Bt part—fine sandy loam or very fine sandy loam

*C horizon:*

Color—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4

Texture—sand, fine sand, loamy fine sand, very fine sand, or loamy very fine sand  
 Content of rock fragments—0 to 10 percent

## ***Aurand Series***

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Loamy glaciolacustrine deposits and the underlying till

*Landform:* Flats on lake plains, beach ridges, and rises on ground moraines

*Position on the landform:* Footslopes on beach ridges and summits and shoulders on lake plains and ground moraines

*Slope range:* 0 to 3 percent

*Adjacent soils:* Alvada, Cygnet, Hoytville, and Shawtown

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aquic Argiudolls

### **Typical Pedon**

Aurand loam, 0 to 2 percent slopes; in Hancock County, Ohio; about 1.2 miles east of McComb; Portage Township; about 800 feet north and 540 feet east of the southwest corner of sec. 19, T. 2 N., R. 10 E.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine roots; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; slightly acid; clear smooth boundary.

Bt1—11 to 17 inches; brown (10YR 4/3) clay loam; moderate fine and very fine subangular blocky structure; friable; common fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; common medium faint dark grayish brown (10YR 4/2) iron depletions in the matrix; few fine and medium prominent strong brown (7.5YR 5/6) and common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

Bt2—17 to 22 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 1 percent rock fragments; slightly alkaline; clear wavy boundary.

Bt3—22 to 29 inches; yellowish brown (10YR 5/4) loam that has thin strata of sandy loam; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 1 percent rock fragments; slightly alkaline; clear wavy boundary.

Btg—29 to 33 inches; grayish brown (10YR 5/2) silty clay loam that has thin strata of sandy loam and loam; weak fine and medium subangular blocky structure; friable;

few fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 1 percent rock fragments; slightly effervescent discontinuously in the matrix; slightly alkaline; abrupt wavy boundary. (0 to 7 inches thick)

2BC—33 to 48 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots; few distinct gray (10YR 5/1) coatings on vertical faces of peds; common distinct light gray (10YR 7/1) calcium carbonate coatings on vertical faces of peds; common medium distinct gray (10YR 5/1) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 2 percent rock fragments; strongly effervescent; moderately alkaline; gradual irregular boundary.

2Cd—48 to 62 inches; brown (10YR 4/3) silty clay loam; massive with widely spaced vertical fractures; very firm; common fine and medium distinct gray (10YR 5/1) iron depletions in the matrix; few fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

2Cd<sub>g</sub>—62 to 80 inches; dark gray (10YR 4/1) silty clay loam; massive with widely spaced vertical fractures; very firm; common fine and medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline.

#### **Range in Characteristics**

*Thickness of the mollic epipedon:* 10 to 15 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 25 to 50 inches

*Depth to till:* 20 to 40 inches

*Depth to densic material:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—horizon has hue of 10YR or 2.5Y or is neutral in hue, has value of 2 or 3, and has chroma of 0 to 2

Texture—loam or silt loam

Content of rock fragments—0 to 10 percent

#### *Bt and Btg horizons:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6

Texture—loam, clay loam, sandy clay loam, or silty clay loam or the gravelly analogues of those textures; thin strata of fine sandy loam, loamy fine sand, sandy loam, loam, or loamy sand occur in some pedons

Content of rock fragments—0 to 20 percent

#### *2BC<sub>g</sub> and 2BC horizons:*

Color—horizons have hue of 10YR or 2.5Y or are neutral in hue, have value of 4 or 5, and have chroma of 0 to 4

Texture—clay loam, silty clay loam, or clay

Content of rock fragments—1 to 7 percent

#### *2Cd or 2Cd<sub>g</sub> horizon:*

Color—horizon has hue of 10YR or 2.5Y or is neutral in hue, has value of 4 or 5, and has chroma of 0 to 4

Texture—clay loam, silty clay loam, or clay

Content of rock fragments—1 to 7 percent

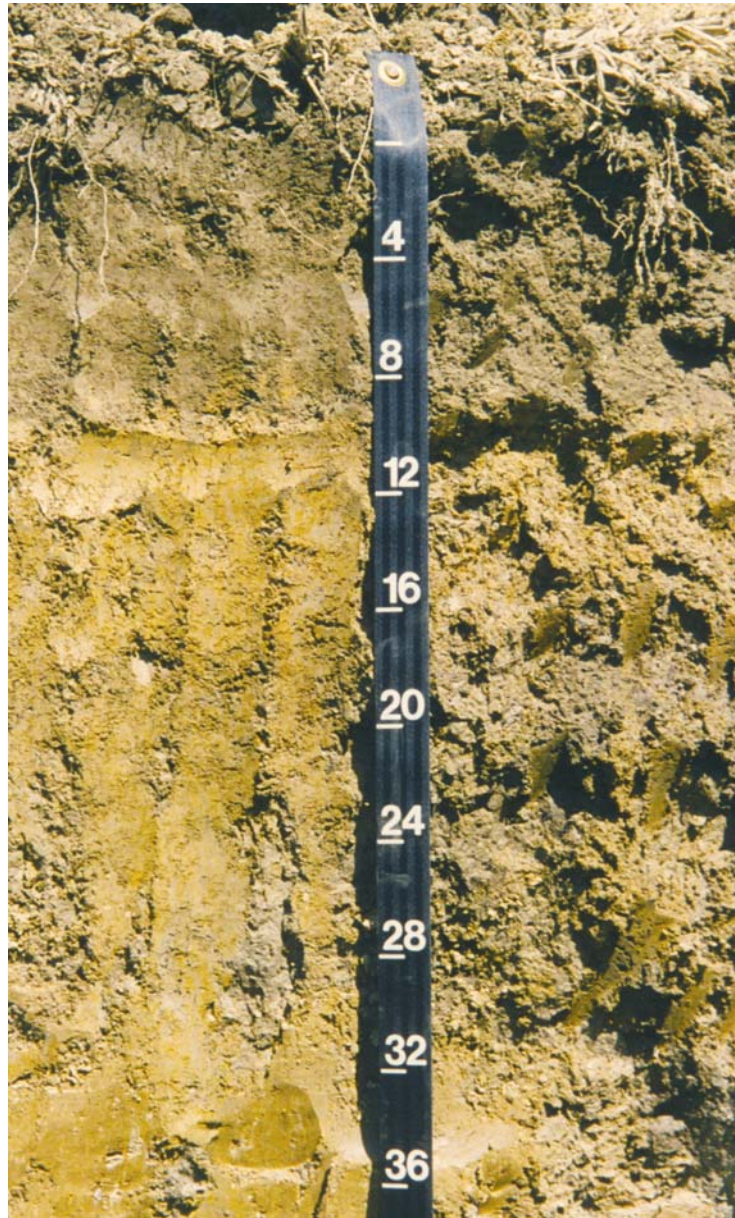


Figure 15.—Profile of a Blount soil. The mottled gray and brown subsoil reflects the intermittent nature of the seasonal high water table. Depth is marked in inches. (Photo from Allen County, Ohio)

### ***Blount Series***

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Till

*Landform:* Rises, flats, and knolls on ground moraines and end moraines

*Position on the landform:* Summits, shoulders, and backslopes

*Slope range:* 0 to 4 percent

*Adjacent soils:* Glynwood and Pewamo

*Taxonomic class:* Fine, illitic, mesic Aeric Epiaqualfs (fig. 15)

### Typical Pedon

Blount silt loam, 0 to 2 percent slopes; in Mercer County, Ohio; about 1.25 miles east of Wabash; Washington Township; 130 feet west and 1,880 feet south of the northeast corner of sec. 3, T. 6 S., R. 1 E.

- Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; common roots; 3 percent gravel; slightly acid; abrupt smooth boundary.
- Btg—7 to 12 inches; grayish brown (10YR 5/2) silty clay; moderate medium subangular blocky structure; firm; common roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct light gray (10YR 7/1) clay depletions on vertical faces of peds; many distinct yellowish brown (10YR 5/4) masses of iron accumulation with clear boundaries in the matrix; 3 percent gravel; strongly acid; clear wavy boundary.
- Bt—12 to 23 inches; dark yellowish brown (10YR 4/4) clay; weak fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; many medium distinct dark grayish brown (10YR 4/2) and common distinct gray (10YR 5/1) iron depletions with clear boundaries in the matrix; common distinct yellowish brown (10YR 5/6) masses of iron accumulation with diffuse boundaries in the matrix; 4 percent gravel; slightly acid; clear wavy boundary.
- BCg—23 to 30 inches; grayish brown (10YR 5/2) silty clay loam; weak medium subangular blocky structure; firm; few faint dark grayish brown (10YR 4/2) clay films on vertical faces of peds; few distinct light gray (10YR 7/2) calcium carbonate coatings on vertical faces of peds; many medium distinct dark yellowish brown (10YR 4/4) and common prominent yellowish brown (10YR 5/6) masses of iron accumulation with clear boundaries in the matrix; 8 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.
- CBd—30 to 42 inches; brown (10YR 4/3) clay loam; weak medium platy structure; very firm; common distinct white (10YR 8/1) calcium carbonate coatings on faces of plates; common faint grayish brown (10YR 5/2) iron depletions with diffuse boundaries in the matrix; 10 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.
- Cd1—42 to 54 inches; brown (10YR 5/3) clay loam; massive with widely spaced vertical fractures; very firm; common distinct light gray (10YR 7/1) calcium carbonate coatings on faces of fractures; few distinct dark gray (10YR 4/1) iron depletions with diffuse boundaries in the matrix; few distinct yellowish brown (10YR 5/6) masses of iron accumulation with clear boundaries; 10 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.
- Cd2—54 to 80 inches; brown (10YR 4/3) clay loam; massive; very firm; few prominent strong brown (7.5YR 5/6) masses of iron accumulation with clear boundaries; 10 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 30 to 60 inches

*Depth to carbonates:* 19 to 40 inches

*Depth to densic material:* 30 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 1 to 3

Texture—silt loam or loam

Content of rock fragments—0 to 5 percent

*Btg or Bt horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—silty clay loam, clay loam, silty clay, or clay

Content of rock fragments—2 to 10 percent

*BCg or CBd horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4

Texture—silty clay loam or clay loam

Content of rock fragments—3 to 12 percent

*Cd or Cdg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4

Texture—silty clay loam or clay loam

Content of rock fragments—5 to 14 percent

**Cygnets Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Loamy deposits and the underlying till

*Landform:* Beach ridges on lake plains, rises on deltas on lake plains, glacial drainage channels, and rises on ground moraines

*Position on the landform:* Summits and shoulders

*Slope range:* 0 to 3 percent

*Adjacent soils:* Hoytville, Rensselaer, and Shawtown

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aquic Hapludalfs

**Typical Pedon**

Cygnets loam, 0 to 3 percent slopes; in Allen County, Ohio; about 1.5 miles west-northwest of Gomer; Sugar Creek Township; about 2,620 feet east and 1,020 feet north of the southwest corner of sec. 19, T. 2 S., R. 6 E.

Ap1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; 5 percent rock fragments; slightly acid; clear smooth boundary.

Ap2—4 to 12 inches; dark grayish brown (10YR 4/2) loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; friable; common fine and very fine roots; 5 percent intermixing of yellowish brown (10YR 5/4) material from Bt1 horizon; common faint dark brown (10YR 3/3) organic coatings on faces of peds; few fine and medium prominent strong brown (7.5YR 5/8) spherical masses of iron accumulation in the matrix; 4 percent rock fragments; strongly acid; abrupt wavy boundary.

Bt1—12 to 19 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common faint brown (10YR 5/3) clay depletions on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few medium distinct black (10YR 2/1) spherical masses of manganese accumulation in the matrix; 4 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—19 to 27 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct grayish brown (10YR 5/2) and few faint dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium prominent strong brown

- (7.5YR 5/8) masses of iron accumulation in the matrix; few distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; 3 percent rock fragments; strongly acid; clear smooth boundary.
- Bt3—27 to 36 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and coarse subangular blocky structure; friable; common fine and very fine roots; few faint brown (10YR 5/3) and many distinct grayish brown (10YR 5/2) clay films on vertical faces of peds; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/8) and distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; common medium distinct black (10YR 2/1) spherical masses of manganese accumulation in the matrix; 3 percent rock fragments; moderately acid; gradual wavy boundary.
- Bt4—36 to 41 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) and prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; 3 percent rock fragments; slightly acid; clear wavy boundary.
- Bt5—41 to 45 inches; brown (10YR 4/3) sandy clay loam; moderate fine and medium subangular blocky structure; very friable; common fine and very fine roots; common distinct grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct dark brown (10YR 3/3) clay bridging between sand grains; common fine distinct yellowish brown (10YR 5/6) and prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; 4 percent rock fragments; neutral; clear wavy boundary.
- Bt6—45 to 50 inches; yellowish brown (10YR 5/4) sandy clay loam that has pockets of dark brown (10YR 3/3) loam; moderate medium and coarse subangular blocky structure; friable; few fine and very fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds and dark grayish brown (10YR 4/2) clay films in root channels and pores; many distinct very dark grayish brown (10YR 3/2) clay bridging in the pockets of loam; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation in the matrix; 1 percent rock fragments; neutral; abrupt smooth boundary.
- 2BC—50 to 56 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium and coarse subangular blocky structure; firm; common distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; common distinct light brownish gray (10YR 6/2) carbonate coatings on vertical faces of peds; common distinct yellowish brown (10YR 5/6) hypocasts along vertical faces of peds; 2 percent rock fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.
- 2Cd1—56 to 68 inches; brown (10YR 5/3) silty clay; massive with widely spaced vertical fractures; very firm; few distinct gray (10YR 5/1) carbonate coatings on fractures; 2 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.
- 2Cd2—68 to 80 inches; brown (10YR 5/3) silty clay loam; massive; very firm; 2 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 33 to 60 inches  
*Depth to carbonates:* 33 to 60 inches  
*Depth to till:* 40 to 60 inches  
*Depth to densic material:* 40 to 60 inches  
*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—loam

Content of rock fragments—0 to 14 percent

*Bt or Btg horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 to 6; chroma of 2 is included in the lower part of horizon

Texture—clay loam, sandy clay loam, loam, or sandy loam or the gravelly analogues of those textures

Content of rock fragments—0 to 30 percent

*2BC horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4

Texture—silty clay loam, clay loam, or silty clay

Content of rock fragments—1 to 7 percent

*2Cd or 2Cdg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4

Texture—silty clay loam, clay loam, or silty clay

Content of rock fragments—1 to 7 percent

**Darroch Series**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Stratified loamy and silty glaciolacustrine deposits

*Landform:* Flats and rises on lake plains

*Position on the landform:* Summits

*Slope range:* 0 to 2 percent

*Adjacent soils:* Hoytville, Rensselaer, and Shawtown

*Taxonomic class:* Fine-loamy, mixed, superactive, mesic Aquic Argiudolls

**Typical Pedon**

Darroch loam, 0 to 2 percent slopes; in Hancock County, Ohio; about 2 miles northwest of Benton Ridge; Blanchard Township; about 840 feet east and 2,050 feet south of the northwest corner of sec. 23, T. 1 N., R. 9 E.

Ap—0 to 11 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine roots; 1 percent rock fragments; slightly acid; clear smooth boundary.

Bt1—11 to 15 inches; brown (10YR 5/3) clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

Bt2—15 to 26 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very

- dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.
- Btg—26 to 30 inches; grayish brown (2.5Y 5/2) sandy clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; many fine and medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; few fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.
- B't1—30 to 34 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and as bridging between sand grains; common fine and medium distinct grayish brown (2.5Y 5/2) iron depletions in the matrix; few medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.
- B't2—34 to 44 inches; brown (10YR 5/3) loam; weak medium and coarse subangular blocky structure; friable; common faint grayish brown (10YR 5/2) clay films on faces of peds; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 1 percent rock fragments; neutral; gradual wavy boundary.
- Cg—44 to 80 inches; grayish brown (10YR 5/2) silt loam that has many thin strata of very fine sandy loam; massive; friable; common medium distinct yellowish brown (10YR 5/4) and few medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine and medium distinct white (10YR 8/1) calcium carbonate concretions in the matrix; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 15 inches

*Thickness of the solum:* 40 to 65 inches

*Depth to carbonates:* 35 to 65 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3

Texture—loam

Content of rock fragments—0 to 3 percent

#### *Bt or Btg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 6

Texture—loam, clay loam, silty clay loam, or silt loam in the upper part of horizon and sandy clay loam, loam, fine sandy loam, or sandy loam in the lower part

Content of rock fragments—0 to 3 percent

#### *C or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 6, and chroma of 1 to 6

Texture—loam or silt loam; strata range from sandy loam to silty clay loam

Content of rock fragments—0 to 14 percent

## ***Eldean Series***

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material:* Outwash

*Landform:* Rises and knolls on ground moraines and stream terraces

*Position on the landform:* Summits, shoulders, backslopes, risers, and treads

*Slope range:* 1 to 4 percent

*Adjacent soils:* Harrod and Lybrand

*Taxonomic class:* Fine, mixed, superactive, mesic Typic Hapludalfs

### **Typical Pedon**

Eldean silt loam, 1 to 4 percent slopes; in Allen County, Ohio; about 1.5 mile southeast of Westminster; Auglaize Township; about 960 feet east and 620 feet south of the northwest corner of sec. 21, T. 4 S., R. 8 E.

Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 5 percent subrounded limestone and shale fragments; neutral; clear smooth boundary.

Bt1—10 to 13 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure; friable; common fine and very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; 5 percent subrounded limestone and shale fragments; neutral; clear smooth boundary.

Bt2—13 to 17 inches; brown (10YR 4/3) clay; moderate fine and medium subangular blocky structure; firm; few medium and common fine and very fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; 5 percent subrounded limestone and sandstone fragments; neutral; clear smooth boundary.

Bt3—17 to 20 inches; brown (10YR 4/3) clay; moderate fine and medium subangular blocky structure; firm; few medium and common fine and very fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; 5 percent subrounded limestone, sandstone, and shale fragments; neutral; clear wavy boundary.

Bt4—20 to 22 inches; dark brown (10YR 3/3) clay loam; moderate fine and medium subangular blocky structure; firm; few medium and common fine and very fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; 5 percent subrounded limestone, shale, and sandstone fragments; 10 percent subrounded limestone paragravel; neutral; clear wavy boundary.

BC—22 to 27 inches; dark brown (10YR 3/3) loam; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; few distinct dark brown (10YR 3/3) clay films on faces of peds; 10 percent subrounded limestone and shale fragments; 5 percent subrounded limestone paragravel; slightly effervescent; slightly alkaline; abrupt wavy boundary.

C1—27 to 65 inches; yellowish brown (10YR 5/4) stratified very gravelly loamy coarse sand, gravelly coarse sand, very gravelly coarse sand, and gravelly sand; single grain; loose; common fine and very fine roots to a depth of 34 inches; 40 percent subrounded limestone fragments in the very gravelly loamy coarse sand and very gravelly coarse sand; 25 percent subrounded limestone and shale fragments in the gravelly coarse sand and gravelly sand; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—65 to 80 inches; brown (10YR 5/3) stratified extremely gravelly loamy sand and very gravelly loamy sand; single grain; loose; 65 percent subrounded limestone fragments in the extremely gravelly loamy sand; 40 percent subrounded limestone fragments in the very gravelly loamy sand; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 20 to 40 inches

*Depth to carbonates:* 18 to 36 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 3

Texture—silt loam

Content of rock fragments—0 to 14 percent

*Bt horizon:*

Color—hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 6

Texture—clay loam or clay or the gravelly analogues of those textures; very gravelly analogues are included in the lower part of horizon

Content of rock fragments—0 to 30 percent in the upper part of horizon and 5 to 40 percent in the lower part

*BC horizon:*

Color—hue of 10YR, value of 3 to 6, and chroma of 3 or 4

Texture—sandy loam, coarse sandy loam, loam, clay loam, or sandy clay loam or the gravelly or very gravelly analogues of those textures

Content of rock fragments—10 to 50 percent

*C horizon:*

Color—hue of 10YR, value of 4 to 6, and chroma of 2 to 4

Texture—gravelly sandy loam to extremely gravelly coarse sand; strata of loamy sand or sand occur in some pedons

Content of rock fragments—0 to 70 percent in individual strata; an average of 30 to 70 percent

## Flatrock Series

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Loamy alluvium overlying limestone or dolostone

*Landform:* Flats, rises, and natural levees on flood plains

*Slope range:* 0 to 2 percent

*Adjacent soils:* Harrod, Knoxdale, Saranac, and Shoals

*Taxonomic class:* Fine-loamy, mixed, active, mesic Fluvaquentic Eutrochrepts

### Typical Pedon

Flatrock silt loam, limestone substratum, 0 to 2 percent slopes, occasionally flooded; in Hancock County, Ohio; about 1.5 miles west of Arlington; Madison Township; about 2,180 feet east and 180 feet north of the southwest corner of sec. 2, T. 2 S., R. 10 E.

Ap—0 to 11 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak medium and coarse subangular blocky structure parting to moderate fine and medium granular; friable; common fine roots; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine faint very dark grayish brown (10YR 3/2) iron and manganese concretions in the matrix; 1 percent rock fragments; neutral; clear smooth boundary.

Bw1—11 to 17 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; few distinct brown (10YR 5/3) coatings on faces of peds; few distinct dark brown (10YR 3/3) organic coatings on faces of peds; common fine distinct yellowish brown (10YR 5/6) and common medium faint brown (10YR 5/3) masses of iron accumulation in the

matrix; common fine distinct very dark gray (10YR 3/1) iron and manganese concretions in the matrix; few distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation on faces of peds; 1 percent rock fragments; slightly acid; gradual smooth boundary.

Bw2—17 to 22 inches; dark yellowish brown (10YR 4/4) loam; moderate fine and medium angular blocky structure; friable; few fine roots; common distinct brown (10YR 5/3) and dark grayish brown (10YR 4/2) coatings on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) iron and manganese concretions in the matrix; few fine distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation on faces of peds; 1 percent rock fragments; slightly acid; gradual wavy boundary.

Bw3—22 to 30 inches; yellowish brown (10YR 5/4) loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) coatings on faces of peds; common faint dark brown (10YR 3/3) coatings on vertical faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many medium and coarse faint dark yellowish brown (10YR 4/4) and common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark gray (10YR 3/1) iron and manganese concretions in the matrix; 1 percent rock fragments; slightly acid; gradual wavy boundary.

Bw4—30 to 41 inches; brown (10YR 5/3) loam; weak medium and coarse subangular blocky structure; friable; few distinct grayish brown (10YR 5/2) coatings on faces of peds; many medium and coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium faint dark yellowish brown (10YR 4/4) and common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint very dark grayish brown (10YR 3/2) iron and manganese concretions in the matrix; few distinct dark brown (7.5YR 3/2) masses of iron and manganese accumulation on faces of peds; 1 percent rock fragments; neutral; gradual wavy boundary.

Bw5—41 to 52 inches; brown (10YR 5/3) sandy loam; weak medium and coarse subangular blocky structure; very friable; few fine roots; few distinct grayish brown (10YR 5/2) coatings on faces of peds; many medium and coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium faint dark yellowish brown (10YR 4/4) and common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint very dark grayish brown (10YR 3/2) iron and manganese concretions in the matrix; common distinct dark brown (7.5YR 3/2) masses of iron and manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear wavy boundary.

Cg—52 to 64 inches; grayish brown (10YR 5/2) sandy loam; massive; very friable; common medium distinct dark yellowish brown (10YR 4/4) and common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint very dark grayish brown (10YR 3/2) iron and manganese concretions in the matrix; 10 percent rock fragments; neutral; abrupt smooth boundary.

2R—64 to 66 inches; limestone.

#### Range in Characteristic

*Thickness of the solum:* 24 to 55 inches

*Depth to carbonates:* 40 to 80 inches

*Depth to bedrock:* 60 to 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 3 to 5, and chroma of 2 or 3

Texture—silt loam

Content of rock fragments—0 to 5 percent

*Bw or Bg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—loam, silty clay loam, or silt loam; subhorizons are clay loam or fine sandy loam

Content of rock fragments—0 to 5 percent

*C or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—loam, silt loam, silty clay loam, clay loam, coarse sandy loam, sandy loam, or fine sandy loam; horizon is commonly stratified

Content of rock fragments—0 to 14 percent

**Fox Series***Depth class:* Very deep*Drainage class:* Well drained*Parent material:* Loamy deposits overlying stratified sandy and gravelly outwash*Landform:* Knolls and rises on glacial drainage channels, stream terraces, outwash plains, and knolls on end moraines*Position on the landform:* Backslopes, shoulders, summits, and risers*Slope range:* 0 to 18 percent*Adjacent soils:* Lybrand, Rensselaer, Sleeth, Thackery, and Westland*Taxonomic class:* Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludalfs (fig. 16)**Typical Pedon**

Fox silt loam, 0 to 2 percent slopes; in Allen County, Ohio; about 0.2 miles north of Rockport; Monroe Township; about 1,800 feet west and 80 feet north of the southeast corner of sec. 12, T. 2 S., R. 7 E.

Ap1—0 to 3 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; many fine and very fine roots; 2 percent rock fragments; neutral; clear smooth boundary.

Ap2—3 to 11 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; 3 percent rock fragments; neutral; abrupt smooth boundary.

2Bt1—11 to 19 inches; dark yellowish brown (10YR 4/4) gravelly clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; 15 percent rock fragments; neutral; clear smooth boundary.

2Bt2—19 to 23 inches; dark yellowish brown (10YR 4/4) gravelly clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; 30 percent rock fragments; neutral; clear wavy boundary.

2Bt3—23 to 27 inches; dark yellowish brown (10YR 4/4) gravelly clay loam; weak fine and medium subangular blocky structure parting to moderate fine and medium granular; friable; few fine and very fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; 20 percent rock fragments; neutral; clear wavy boundary.

2Bt4—27 to 30 inches; dark brown (10YR 3/3) gravelly clay loam; moderate fine and



**Figure 16.—Profile of a Fox soil. The dark yellowish brown subsoil tongues into the sandy and gravelly substratum. Depth is marked in feet. (Photo from Hancock County, Ohio)**

medium subangular blocky structure; friable; few fine and very fine roots; common faint dark brown (10YR 3/3) clay films on faces of peds; 25 percent rock fragments; slightly alkaline; abrupt irregular boundary.

2Bt5—30 to 33 inches; dark brown (10YR 3/3) gravelly clay; moderate fine and medium subangular blocky structure; friable; few fine and very fine roots; common faint dark brown (10YR 3/3) clay films on faces of peds; 25 percent rock fragments; slightly alkaline; clear irregular boundary.

3C1—33 to 44 inches; stratified brown (10YR 5/3) very gravelly sand and yellowish

- brown (10YR 5/4) gravelly loamy sand; single grain; loose; 50 percent rock fragments in the very gravelly sand and 15 percent rock fragments in the gravelly loamy sand; strongly effervescent; moderately alkaline; gradual wavy boundary.
- 3C2—44 to 52 inches; brown (10YR 5/3) very gravelly sand; single grain; loose; 50 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.
- 3C3—52 to 62 inches; brown (10YR 5/3) stratified very gravelly sand and very gravelly loamy sand; single grain; loose; 50 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.
- 3C4—62 to 80 inches; brown (10YR 5/3) stratified loamy sand and gravelly loamy sand; single grain; loose; 5 percent rock fragments in the loamy sand and 18 percent rock fragments in the gravelly loamy sand; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the solum:* 20 to 40 inches

*Depth to carbonates:* 20 to 40 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3

Texture—silt loam or loam

Content of rock fragments—2 to 14 percent

#### *2Bt horizon:*

Color—hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4

Texture—clay loam, sandy clay loam, or loam or the gravelly analogues of those textures; thin layers of clay or gravelly clay are included in the lower part (beta horizon)

Content of rock fragments—0 to 35 percent

#### *3C horizon:*

Color—hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 3 or 4

Texture—loamy sand, loamy coarse sand, coarse sand, or sand or the gravelly to extremely gravelly analogues of those textures

Content of rock fragments—0 to 50 percent

## ***Gallman Series***

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material:* Poorly sorted outwash

*Landform:* Rises and knolls on outwash plains and glacial drainage channels

*Position on the landform:* Shoulders, summits, and backslopes

*Slope range:* 0 to 12 percent

*Adjacent soils:* Blount, Pewamo, Sleeth, Thackery, and Westland

*Taxonomic class:* Fine-loamy, mixed, active, mesic Typic Hapludalfs

### Typical Pedon

Gallman loam, 2 to 6 percent slopes; in Mercer County, Ohio; 2 miles northwest of Rockford, in the Blackloon Reserve; Dublin Township; 1,372 feet west and 1,425 feet north of the intersection of Blackloon Road and River Trail Road, T. 4 S., R. 2 E.

Ap—0 to 8 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; many fine roots; 2 percent fine gravel; neutral; abrupt smooth boundary.

- BE—8 to 11 inches; yellowish brown (10YR 5/4) loam; weak fine and medium subangular blocky structure; friable; common fine roots; few distinct brown (7.5YR 4/4) clay films on faces of peds; common faint pale brown (10YR 6/3) clay depletions on faces of peds; 2 percent fine gravel; slightly acid; clear smooth boundary.
- Bt1—11 to 20 inches; brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; common fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; few distinct pale brown (10YR 6/3) clay depletions on faces of peds; 3 percent fine gravel; very strongly acid; clear wavy boundary.
- Bt2—20 to 30 inches; brown (7.5YR 4/4) gravelly clay loam; moderate coarse subangular blocky structure; firm; few fine roots; common faint brown (7.5YR 4/2) clay films on faces of peds; few distinct pale brown (10YR 6/3) clay depletions on faces of peds; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; 15 percent fine shale and crystalline gravel; very strongly acid; abrupt wavy boundary.
- Bt3—30 to 37 inches; brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; few fine roots; common distinct brown (7.5YR 4/2) clay films on faces of peds and clay bridging between sand grains and gravel; 8 percent fine gravel, mainly black shale; strongly acid; clear wavy boundary.
- Bt4—37 to 52 inches; dark brown (7.5YR 3/2) gravelly sandy clay loam; massive; firm; few fine roots; many faint dark brown (7.5YR 3/2) clay bridging between sand grains and gravel; 15 percent fine gravel, mainly black shale; slightly acid; gradual wavy boundary.
- Bt5—52 to 66 inches; dark brown (10YR 3/3) gravelly sandy clay loam; massive; firm; common faint very dark grayish brown (10YR 3/2) clay bridging between sand grains and gravel; 25 percent fine gravel, mainly black shale; neutral; gradual wavy boundary.
- Bt6—66 to 75 inches; brown (7.5YR 4/4) sandy loam that has thin lenses of silt loam; massive; friable; few faint clay bridging between sand grains; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; 2 percent fine gravel; neutral; abrupt wavy boundary.
- C—75 to 90 inches; grayish brown (10YR 5/2) loamy sand; single grain; loose; common coarse distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 2 percent gravel; strongly effervescent; moderately alkaline.

#### Range in Characteristics

*Thickness of the solum:* 55 to 120 inches

*Depth to carbonates:* 55 to 120 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—silt loam or loam

Content of rock fragments—0 to 14 percent

#### *Bt horizon:*

Color—hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4

Texture—loam, clay loam, sandy clay loam, sandy loam, or coarse sandy loam or the gravelly analogues of those textures; the very gravelly analogues are included in the lower part of horizon

Content of rock fragments—2 to 30 percent in the upper part of horizon and 2 to 40 percent in the lower part

#### *Cg or C horizon:*

Color—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 4

Texture—sandy loam, loamy sand, or sand or the gravelly or very gravelly analogues of those textures  
 Content of rock fragments—0 to 40 percent

## ***Glynwood Series***

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Till

*Landform:* Rises, knolls, and dissected areas on ground moraines and end moraines

*Position on the landform:* Shoulders, summits, and backslopes

*Slope range:* 0 to 12 percent

*Adjacent soils:* Blount, Houcktown, and Pewamo

*Taxonomic class:* Fine, illitic, mesic Aquic Hapludalfs

### **Typical Pedon**

Glynwood silt loam, 2 to 6 percent slopes; in Hancock County, Ohio; about 1.5 miles southeast of Vanlue; Amanda Township; about 1,760 feet west and 1,460 feet north of the southeast corner of sec. 15, T. 1 S., R. 12 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; few medium and common fine roots; 5 percent intermixed yellowish brown (10YR 5/6) material from Bt1 horizon; less than 1 percent rock fragments; neutral; clear smooth boundary.

Bt1—9 to 13 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium and fine subangular blocky structure; friable; common fine roots; few distinct yellowish brown (10YR 5/4) clay films on faces of peds; common distinct brown (10YR 4/3) coatings in worm channels; common fine prominent grayish brown (10YR 5/2) iron depletions in the matrix; common distinct brown (10YR 5/3) clay depletions on vertical faces of peds; few medium faint strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine prominent very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 1 percent rock fragments; neutral; gradual wavy boundary.

Bt2—13 to 21 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct brown (10YR 5/3) and few faint brown (10YR 4/3) clay films on faces of peds; few faint brown (10YR 4/3) coatings in worm channels; few medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few faint brown (10YR 5/3) clay depletions on vertical faces of peds; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few distinct very dark gray (10YR 3/1) masses of iron and manganese oxide accumulation on faces of peds; 2 percent rock fragments; slightly acid; gradual wavy boundary.

Bt3—21 to 30 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) and common faint brown (10YR 4/3) clay films on faces of peds; few faint brown (10YR 4/3) coatings in worm channels; few medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few distinct very dark gray (10YR 3/1) masses of iron and manganese oxide accumulation on faces of peds; 2 percent rock fragments; neutral; gradual wavy boundary.

Bt4—30 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few distinct grayish brown (10YR 5/2) and common faint brown (10YR 5/3) clay films on faces of peds; few distinct brown (10YR 4/3) coatings in worm channels; common medium distinct grayish

brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common distinct very dark gray (10YR 3/1) masses of iron and manganese oxide accumulation on faces of peds; few faint pale brown (10YR 6/3) masses of calcium carbonate accumulation on vertical faces of peds; 3 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.

BC—37 to 47 inches; yellowish brown (10YR 5/4) clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots in the upper part of horizon; common distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few faint pale brown (10YR 6/3) masses of calcium carbonate accumulation on vertical faces of peds; 4 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.

Cd—47 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive with widely spaced vertical fractures; very firm; common medium distinct grayish brown (10YR 5/2) iron depletions and few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation oriented along fractures; few faint pale brown (10YR 6/3) masses of calcium carbonate accumulation oriented along faces of fractures; 4 percent rock fragments; strongly effervescent; moderately alkaline.

#### **Range in Characteristics**

*Thickness of the solum:* 25 to 50 inches

*Depth to carbonates:* 16 to 40 inches

*Depth to densic material:* 25 to 50 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, loam, clay loam, or silty clay loam

Content of rock fragments—0 to 5 percent

#### *Bt or Btg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6

Texture—silty clay, clay, clay loam, or silty clay loam

Content of rock fragments—0 to 10 percent

#### *BC horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4

Texture—silty clay loam or clay loam

Content of rock fragments—1 to 13 percent

#### *Cd or Cd<sub>g</sub> horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 14 percent

### **Harrod Series**

*Depth class:* Moderately deep

*Drainage class:* Moderately well drained

*Parent material:* Loamy alluvium overlying limestone or dolostone

*Landform:* Flats and natural levees on flood plains

*Slope range:* 0 to 1 percent

*Adjacent soils:* Flatrock, Medway, Shoals, and Sloan

*Taxonomic class:* Fine-loamy, mixed, superactive, mesic Fluvaquentic Hapludolls

### Typical Pedon

Harrod silt loam, 0 to 1 percent slopes, frequently flooded; in Allen County, Ohio; about 0.5 mile east of Westminster; Auglaize Township; about 1,440 feet north and 1,550 feet east of the southwest corner of sec. 17, T. 4 S., R. 8 E.

- Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine and very fine subangular blocky structure; friable; many fine and very fine and common medium roots; few fine prominent white (10YR 8/1) masses of calcium carbonate in the matrix; very slightly effervescent; slightly alkaline; clear smooth boundary.
- Bw1—11 to 14 inches; dark grayish brown (10YR 4/2) loam; moderate fine and medium subangular blocky structure; friable; common medium to very fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine prominent reddish brown (5YR 4/4) masses of iron and manganese accumulation in the matrix; slightly effervescent; moderately alkaline; clear smooth boundary.
- Bw2—14 to 19 inches; dark grayish brown (10YR 4/2) loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common fine and very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine prominent yellowish brown (10YR 5/6) and distinct brown (7.5YR 4/4) masses of iron accumulation in the matrix; few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; slightly effervescent; moderately alkaline; clear wavy boundary.
- Bw3—19 to 27 inches; dark grayish brown (10YR 4/2) loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; few faint gray (10YR 5/1) iron depletions on faces of peds; common fine prominent yellowish brown (10YR 5/6) and few fine prominent reddish brown (5YR 4/4) masses of iron accumulation in the matrix; few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 4 percent limestone fragments; slightly effervescent; moderately alkaline; clear wavy boundary.
- Bg—27 to 31 inches; gray (10YR 5/1) sandy clay loam that has strata of sandy loam; weak medium and coarse subangular blocky structure; friable; few prominent brown (7.5YR 4/4) masses of iron accumulation on faces of peds and in the matrix; 2 percent angular limestone channers; 9 percent subangular limestone fragments; slightly effervescent; moderately alkaline; abrupt smooth boundary.
- 2R—31 inches; white (10YR 8/1) limestone.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 20 inches

*Thickness of the solum:* 20 to 40 inches

*Depth to carbonates:* 0 to 40 inches

*Depth to bedrock:* 20 to 40 inches

#### *Ap or A horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2

Texture—silt loam

Content of rock fragments—0 to 7 percent

#### *Bw horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam or loam in the upper part of horizon and clay loam to sandy loam in the lower part

Content of rock fragments—0 to 5 percent in the upper part of horizon and 0 to 14 percent in the lower part

*Bg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 1 or 2

Texture—sandy clay loam, loam, or sandy loam

Content of rock fragments—5 to 14 percent

**Houcktown Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Loamy water-sorted deposits and the underlying till

*Landform:* Rises and knolls on ground moraines, end moraines, lake plains, and deltas on lake plains and dissected areas along streams on ground moraines

*Position on the landform:* Shoulders, summits, and backslopes

*Slope range:* 0 to 12 percent

*Adjacent soils:* Blount, Glynwood, and Shawtown

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aquic Hapludalfs (fig. 17)

**Typical Pedon**

Houcktown loam, 2 to 6 percent slopes; in Hancock County, Ohio; about 2 miles southwest of Benton Ridge; Union Township; about 2,200 feet north and 480 feet west of the southeast corner of sec. 4, T. 1 S., R. 9 E.

Ap—0 to 10 inches; dark brown (10YR 3/3) loam, light gray (10YR 7/2) dry; weak fine and medium granular structure; friable; common fine and few medium roots; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; 6 percent rock fragments; moderately acid; abrupt smooth boundary.

Bt1—10 to 16 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; friable; common fine roots; few faint brown (10YR 4/3) clay films on faces of peds; common distinct brown (10YR 5/3) coatings on faces of peds; few distinct dark brown (10YR 3/3) organic coatings on faces of peds and in pores; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium and coarse faint brown (10YR 5/3) and few fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine distinct dark brown (7.5YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 8 percent rock fragments; slightly acid; gradual wavy boundary.

Bt2—16 to 20 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many medium and coarse faint dark yellowish brown (10YR 4/4) and common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct dark brown (7.5YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 6 percent rock fragments; slightly acid; clear wavy boundary.

Bt3—20 to 27 inches; brown (10YR 5/3) sandy clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; many medium and coarse faint dark yellowish brown (10YR 4/4) and common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common medium distinct dark brown (7.5YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 9 percent rock fragments; neutral; clear smooth boundary.

Bt4—27 to 30 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium



**Figure 17.—Profile of a Houcktown soil. The darker loamy layer at a depth of about 2 feet marks the irregular boundary between the loamy sediments and the underlying till. Depth is marked in feet. (Photo from Hancock County, Ohio)**

and coarse subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium distinct dark gray (10YR 4/1) iron depletions in the matrix; common medium distinct strong brown (7.5YR 5/6) and faint dark brown (7.5YR 3/4) masses of iron accumulation in the matrix; common medium distinct very dark grayish brown

- (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 11 percent rock fragments; neutral; abrupt smooth boundary.
- 2Bt5—30 to 34 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct dark gray (10YR 4/1) clay films on faces of peds and in pores; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 3 percent rock fragments; slightly effervescent discontinuously in the matrix; slightly alkaline; gradual wavy boundary.
- 2BC—34 to 50 inches; yellowish brown (10YR 5/4) clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots; common distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common distinct light brownish gray (10YR 6/2) masses of calcium carbonate accumulation on vertical faces of peds; 4 percent rock fragments; strongly effervescent; moderately alkaline; gradual irregular boundary.
- 2Cd1—50 to 70 inches; yellowish brown (10YR 5/4) silt loam; massive with widely spaced vertical fractures; very firm; common distinct grayish brown (10YR 5/2) coatings on faces of fractures; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common distinct light brownish gray (10YR 6/2) masses of calcium carbonate accumulation on faces of fractures; 5 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.
- 2Cd2—70 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive with widely spaced vertical fractures; very firm; few distinct grayish brown (10YR 5/2) coatings on faces of fractures; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common distinct light brownish gray (10YR 6/2) masses of calcium carbonate accumulation on faces of fractures; 4 percent rock fragments; strongly effervescent; moderately alkaline.

#### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 25 to 45 inches

*Depth to till:* 20 to 40 inches

*Depth to densic material:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—loam, sandy loam, or silt loam

Content of rock fragments—0 to 10 percent

#### *Bt or Btg horizon:*

Color—hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4

Texture—loam, clay loam, or sandy clay loam or the gravelly analogues of those

textures; strata of fine sandy loam, sandy loam, silt loam, or silty clay loam occur in some pedons  
Content of rock fragments—0 to 25 percent

*2Bt and 2BC horizons:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4  
Texture—clay loam or silty clay loam  
Content of rock fragments—1 to 7 percent

*2Cd horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4  
Texture—clay loam, loam, silt loam, or silty clay loam  
Content of rock fragments—1 to 7 percent

## **Hoytville Series**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Till

*Landform:* Flats, depressions, and drainageways on lake plains

*Slope range:* 0 to 1 percent

*Adjacent soils:* Aurand and Nappanee

*Taxonomic class:* Fine, illitic, mesic Mollic Epiaqualfs

### **Typical Pedon**

Hoytville clay loam, 0 to 1 percent slopes; in Wood County, Ohio; about 2.5 miles northeast of Hoytville, at the Ohio Agricultural Research and Development Center, Northwestern Branch (Hoytville farm); Henry Township; 2,000 feet east and 1,000 feet north of the southwest corner of sec. 18, T. 3 N., R 10 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; firm; common fine roots throughout; common fine distinct brown (7.5YR 4/4) masses of iron accumulation in the matrix; 2 percent rock fragments (subangular limestone and shale); slightly acid; clear smooth boundary.

Btg1—9 to 18 inches; dark gray (2.5Y 4/1) clay; moderate fine and medium subangular blocky structure; very firm; few fine roots between peds; few distinct gray (10YR 5/1) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic stains on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) manganese threads in the matrix; 2 percent rock fragments (subrounded igneous and subangular limestone and shale); neutral; clear wavy boundary.

Btg2—18 to 27 inches; grayish brown (10YR 5/2) clay; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots between peds; common faint gray (10YR 5/1) clay films on faces of peds; many medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) manganese threads in the matrix; 2 percent rock fragments (subangular limestone and shale); neutral; clear wavy boundary.

Btg3—27 to 42 inches; grayish brown (10YR 5/2) clay; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots between peds; common faint gray (10YR 5/1) clay films on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct black (10YR 2/1) manganese threads in the matrix; 2 percent rock fragments (subrounded igneous and

subangular limestone and shale); slightly effervescent discontinuously at a depth of 37 inches; strongly effervescent at a depth of 40 inches; slightly alkaline; gradual wavy boundary.

Bt—42 to 52 inches; yellowish brown (10YR 5/4) clay; weak coarse angular blocky structure; firm; few fine roots between peds; common distinct gray (10YR 5/1) clay films on vertical faces of peds; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) manganese threads in the matrix; 3 percent rock fragments (subrounded igneous and subangular limestone and shale); strongly effervescent; slightly alkaline; clear wavy boundary.

BC—52 to 60 inches; dark yellowish brown (10YR 4/4) clay loam; weak coarse prismatic structure parting to weak coarse angular blocky; firm; few fine roots between peds; common distinct gray (10YR 5/1) coatings on vertical faces of prisms; few distinct light gray (10YR 7/1) carbonate coatings on vertical faces of prisms; few continuous prominent yellowish brown (10YR 5/6) hypocasts beneath the carbonate coatings; common fine and medium distinct gray (10YR 5/1) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) manganese threads in the matrix; common medium distinct light gray (10YR 7/1) carbonate masses on vertical faces of prisms; 5 percent rock fragments (subrounded igneous and subangular limestone and shale); strongly effervescent; moderately alkaline; clear wavy boundary.

Cd1—60 to 72 inches; dark yellowish brown (10YR 4/4) clay loam; massive with widely spaced vertical fractures; very firm; few distinct light gray (10YR 7/1) carbonate coatings on faces of fractures; few discontinuous prominent yellowish brown (10YR 5/4) hypocasts beneath the carbonate coatings; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) manganese threads on faces of fractures; common fine distinct light gray (10YR 7/1) carbonate masses on faces of fractures; 5 percent rock fragments (subrounded igneous and subangular limestone and shale); strongly effervescent; moderately alkaline; clear wavy boundary.

Cd2—72 to 84 inches; brown (10YR 4/3) clay loam; massive; very firm; common fine faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct black (10YR 2/1) manganese threads in the matrix; 5 percent rock fragments (subrounded igneous and subangular limestone and shale); strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the dark surface layer:* 7 to 9 inches

*Thickness of the solum:* 40 to 65 inches

*Depth to carbonates:* 30 to 55 inches

*Depth to densic material:* 50 to 70 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR or 2.5Y, value of 2, 2.5, or 3, and chroma of 1 or 2

Texture—silty clay loam

Content of rock fragments—0 to 5 percent

#### *Btg or Bt horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2; chroma of 3 or 4 is included in the lower part of horizon

Texture—clay, silty clay, or silty clay loam  
Content of rock fragments—1 to 10 percent

*BC or BCg horizon:*

Color—hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 4  
Texture—clay, silty clay, clay loam, or silty clay loam  
Content of rock fragments—2 to 10 percent

*Cd or Cd<sub>g</sub> horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 6  
Texture—clay loam, silty clay loam, clay, or silty clay  
Content of rock fragments—2 to 10 percent

## ***Jenera Series***

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Stratified loamy and silty glaciolacustrine deposits and the underlying till

*Landform:* Rises on ground moraines

*Position on the landform:* Summits and shoulders

*Slope range:* 0 to 3 percent

*Adjacent soils:* Blount, Houcktown, Pewamo, and Rensselaer

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aquic Hapludalfs

### **Typical Pedon**

Jenera fine sandy loam, 0 to 2 percent slopes; in Hancock County, Ohio; about 3.5 miles northwest of Benton Ridge; Blanchard Township; about 375 feet west and 125 feet south of the northeast corner of sec. 19, T. 1 N., R. 9 E.

Ap—0 to 10 inches; brown (10YR 4/3) fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; very friable; common fine roots; few fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; slightly acid; clear smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common faint brown (10YR 5/3) clay films on faces of peds; common distinct brown (10YR 4/3) organic coatings on vertical faces of peds; common distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common medium and coarse distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; neutral; gradual wavy boundary.

Bt2—16 to 24 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common faint brown (10YR 4/3) and few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common fine and medium distinct black (10YR 2/1) masses of manganese oxide accumulation on faces of peds; neutral; clear wavy boundary.

Bt3—24 to 31 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many medium and coarse

distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common fine and medium distinct black (10YR 2/1) masses of manganese oxide accumulation on faces of peds; neutral; gradual wavy boundary.

**Bt4**—31 to 37 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common fine and medium distinct black (10YR 2/1) masses of manganese oxide accumulation on faces of peds; neutral; abrupt irregular boundary.

**2BC1**—37 to 50 inches; brown (10YR 4/3) silty clay loam that has thin strata of silt loam; weak coarse subangular blocky structure; firm; common distinct gray (10YR 5/1) coatings on faces of peds; common fine and medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; common faint pale brown (10YR 6/3) masses of calcium carbonate accumulation on faces of peds; strongly effervescent; slightly alkaline; clear wavy boundary.

**3BC2**—50 to 56 inches; brown (10YR 4/3) clay loam; weak medium and coarse subangular blocky structure; firm; few distinct gray (10YR 5/1) coatings on vertical faces of peds; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few medium and coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few faint pale brown (10YR 6/3) masses of calcium carbonate accumulation on vertical faces of peds; 5 percent rock fragments; strongly effervescent; slightly alkaline; gradual irregular boundary.

**3C**—56 to 80 inches; brown (10YR 4/3) clay loam; massive with weak medium platy structure; firm; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 5 percent rock fragments; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the loamy glaciolacustrine material:* 20 to 45 inches

*Thickness of the solum:* 40 to 65 inches

*Depth to carbonates:* 25 to 55 inches

*Depth to till:* 40 to 60 inches

*Depth to densic material:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—fine sandy loam

Content of rock fragments—0 to 5 percent

#### *Bt horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 to 6

Texture—loam, sandy clay loam, or clay loam; thin strata of fine sandy loam, sandy loam, silt loam, or silty clay loam occur in some pedons

Content of rock fragments—0 to 5 percent

*2Bt or 2BC horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4

Texture—silty clay loam or silt loam

Rock fragments—typically none

*3BC horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 7 percent

*3C horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 7 percent

**Knoxdale Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material:* Loamy alluvium

*Landform:* Rises and natural levees on flood plains

*Slope range:* 0 to 2 percent

*Adjacent soils:* Medway, Saranac, and Shoals

*Taxonomic class:* Fine-loamy, mixed, active, mesic Dystric Fluventic Eutrochrepts

**Typical Pedon**

Knoxdale silt loam, 0 to 2 percent slopes, occasionally flooded; in Allen County, Ohio; about 2.5 miles north of Elida; Sugar Creek Township; about 1,300 feet south and 140 feet east of the northwest corner of sec. 32, T. 2 S., R. 6 E.

Ap1—0 to 5 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak medium granular structure; friable; many very fine to medium roots; neutral; clear smooth boundary.

Ap2—5 to 11 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; friable; many very fine to medium roots; neutral; abrupt smooth boundary.

Bw1—11 to 19 inches; brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable; many fine and very fine and common medium roots; many distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; slightly alkaline; clear smooth boundary.

Bw2—19 to 28 inches; brown (10YR 4/3) silt loam; weak fine and medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine to medium roots; many distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; slightly alkaline; clear smooth boundary.

Bw3—28 to 38 inches; brown (10YR 4/3) loam; weak coarse subangular blocky structure parting to weak fine and medium subangular blocky; friable; common fine and very fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; slightly alkaline; gradual smooth boundary.

Bw4—38 to 46 inches; brown (10YR 4/3) loam; weak coarse subangular blocky structure parting to moderate fine and medium subangular blocky; friable; common fine and very fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; slightly alkaline; clear smooth boundary.

Bw5—46 to 55 inches; brown (10YR 5/3) loam; weak coarse subangular blocky structure; friable; few distinct dark grayish brown (10YR 4/2) organic coatings on

vertical faces of peds; common fine faint grayish brown (10YR 5/2) iron depletions in the matrix; common distinct black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; neutral; clear smooth boundary.

C—55 to 63 inches; brown (10YR 5/3) loam; massive; friable; many fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium faint dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; many distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; 2 percent subrounded rock fragments; slightly alkaline; gradual smooth boundary.

Cg—63 to 80 inches; gray (10YR 5/1) sandy loam; massive; friable; many medium and coarse prominent brown (7.5YR 4/4) masses of iron accumulation in the matrix; 3 percent subrounded rock fragments; neutral.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* More than 80 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—silt loam

Content of rock fragments—0 or 1 percent

#### *Bw horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4

Texture—silt loam or loam; thin subhorizons of silty clay loam occur in some pedons

Content of rock fragments—0 to 3 percent

#### *C or Cg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4; chroma of 1 or 2 is included in the lower part of horizon

Texture—loam, sandy loam, fine sandy loam, or silt loam; horizon is commonly stratified

Content of rock fragments—0 to 14 percent

The Knoxdale soils in Allen County are considered taxadjuncts to the series because they have less sand coarser than very fine sand in the particle-size control section than is defined in the range for the series. They classify as fine-silty, mixed, active, mesic Dystric Fluventic Eutrochrepts, according to the 7th edition of "Keys to Soil Taxonomy." This difference, however, does not significantly affect the use and management of the soils.

## **Lybrand Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Parent material:* Till

*Landform:* Dissected areas along streams and glacial drainage channels on ground moraines and end moraines and knolls on ground moraines and end moraines

*Position on the landform:* Backslopes and shoulders

*Slope range:* 6 to 55 percent

*Adjacent soils:* Blount, Fox, and Glynwood

*Taxonomic class:* Fine, illitic, mesic Typic Hapludalfs

### Typical Pedon

Lybrand silt loam, 12 to 18 percent slopes, eroded; in Delaware County, Ohio; about 6 miles west of Delaware; Scioto Township; about 550 feet north and 1,000 feet west of the intersection of U.S. Highway 36 and Ohio Highway 257:

- Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine and very fine roots; 2 percent gravel; neutral; abrupt smooth boundary.
- Bt1—9 to 13 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; common very fine roots; common distinct brown (10YR 4/3) organic coatings on faces of peds; few distinct brown (7.5YR 4/2) clay films on faces of peds; 2 percent gravel; neutral; clear smooth boundary.
- Bt2—13 to 21 inches; yellowish brown (10YR 5/4) silty clay; strong medium and fine subangular blocky structure; firm; common very fine roots; many distinct brown (7.5YR 4/2 and 4/4) clay films on faces of peds; 2 percent gravel; neutral; gradual smooth boundary.
- Bt3—21 to 27 inches; yellowish brown (10YR 5/4) silty clay; weak medium prismatic structure parting to strong medium subangular blocky; firm; few very fine roots; many distinct brown (7.5YR 4/2 and 4/4) clay films on faces of peds; 2 percent gravel; slightly alkaline; gradual wavy boundary.
- Bt4—27 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to strong medium subangular blocky; firm; few very fine roots; many distinct brown (7.5YR 4/2 and 4/4) clay films on faces of peds; 2 percent gravel; moderately alkaline; gradual wavy boundary.
- BC—33 to 45 inches; yellowish brown (10YR 5/4) silty clay loam; weak thick platy structure parting to weak fine subangular blocky; firm; few very fine roots; few distinct brown (7.5YR 4/4) clay films on faces of peds; common distinct grayish brown (10YR 5/2) carbonate coatings on faces of peds; very few distinct light gray (10YR 7/1) carbonate coatings in old root channels; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; few distinct light gray (10YR 7/1) carbonate threads and accumulations in the matrix; 5 percent limestone and shale gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.
- Cd—45 to 80 inches; brown (10YR 5/3) silty clay loam; massive with weak thick platy partings and widely spaced vertical fractures; very firm; common distinct light gray (10YR 7/2) carbonate coatings on vertical fractures; common faint grayish brown (10YR 5/2) iron depletions on vertical fractures; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; common faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of vertical fractures; 5 percent limestone and shale gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 16 to 40 inches

*Depth to densic material:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—silty clay loam or silt loam

Content of rock fragments—0 to 10 percent

*Bt horizon:*

Color—hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6

Texture—clay loam, silty clay loam, silty clay, or clay

Content of rock fragments—0 to 10 percent

*BC horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—silty clay loam or clay loam

Content of rock fragments—0 to 10 percent

*Cd horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4

Texture—clay loam or silty clay loam

Content of rock fragments—2 to 14 percent

## **Medway Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Loamy alluvium

*Landform:* Flats on flood plains

*Slope range:* 0 to 2 percent

*Adjacent soils:* Knoxdale, Saranac, and Sloan

*Taxonomic class:* Fine-loamy, mixed, superactive, mesic Fluvaquentic Hapludolls (fig. 18)

### **Typical Pedon**

Medway silt loam, 0 to 2 percent slopes, occasionally flooded; in Allen County, Ohio; within the Lima city limits; Shawnee Township; about 400 feet east and 200 feet south of the northwest corner of sec. 1, T. 4 S., R. 6 E.

Ap1—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; many fine and very fine and few medium roots; neutral; clear smooth boundary.

Ap2—5 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; common fine and very fine and few medium roots; neutral; clear wavy boundary.

BA—10 to 19 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear wavy boundary.

Bw1—19 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; few faint very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; many faint brown (10YR 5/3) coatings on vertical faces of peds; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; few fine and medium distinct black (10YR 2/1) masses of manganese accumulation in the matrix; neutral; clear wavy boundary.

Bw2—26 to 31 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; few faint very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; few faint brown (10YR 5/3) coatings on vertical faces of peds; common fine and medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common fine faint brown (7.5YR 5/4) masses of iron accumulation in the matrix; common fine



Figure 18.—Profile of a Medway soil. An apparent seasonal high water table occurs in the subsoil from December to April. Depth is marked in feet. (Photo from Hancock County, Ohio)

and medium distinct black (10YR 2/1) masses of manganese accumulation in the matrix; slightly alkaline; clear smooth boundary.  
Bw3—31 to 36 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm;

- common fine roots; few faint very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few faint yellowish brown (10YR 5/4) masses of iron accumulation on vertical faces of peds; common fine and medium faint brown (7.5YR 5/4) masses of iron accumulation in the matrix; common fine and medium distinct black (10YR 2/1) masses of manganese accumulation in the matrix; slightly alkaline; clear wavy boundary.
- Bw4—36 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; very few distinct dark grayish brown (10YR 4/2) organic coatings in root channels and pores; few distinct grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) coatings on vertical faces of peds; common fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; few faint yellowish brown (10YR 5/4) masses of iron accumulation on vertical faces of peds; common fine and medium distinct strong brown (7.5YR 5/6) and common medium faint brown (7.5YR 4/4) masses of iron accumulation in the matrix; common medium and coarse distinct black (10YR 2/1) masses of manganese accumulation in the matrix; neutral; gradual wavy boundary.
- Bw5—45 to 58 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable; few fine roots; few distinct grayish brown (10YR 5/2) coatings in root channels and pores; few distinct dark grayish brown (10YR 4/2) coatings on vertical faces of peds; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few faint brown (7.5YR 5/4) masses of iron accumulation on vertical faces of peds; many fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; many medium and coarse distinct black (10YR 2/1) masses of manganese accumulation in the matrix; neutral; clear wavy boundary.
- C1—58 to 75 inches; brown (10YR 5/3) loam; massive; friable; few distinct dark grayish brown (10YR 4/2) coatings in root channels and pores; common fine and medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; common fine and medium distinct black (10YR 2/1) masses of manganese accumulation in the matrix; neutral; clear wavy boundary.
- C2—75 to 80 inches; yellowish brown (10YR 5/4) silt loam that has thin strata of loam; massive; friable; many coarse and very coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; many fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 23 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 54 to more than 80 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3

Texture—silt loam

Content of rock fragments—0 to 5 percent

#### *Bw or Bg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, silty clay loam, clay loam, or loam

Content of rock fragments—0 to 5 percent

#### *C or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4

Texture—silt loam, loam, or sandy loam; horizon is commonly stratified  
 Content of rock fragments—0 to 5 percent

The Medway soils in Allen County are considered taxadjuncts to the series because they have less sand coarser than very fine sand in the particle-size control section than is defined in the range for the series. They classify as fine-silty, mixed, superactive, mesic Fluvaquentic Hapludolls, according to the 7th edition of “Keys to Soil Taxonomy.” This difference, however, does not significantly affect the use and management of the soils.

## ***Millsdale Series***

*Depth class:* Moderately deep

*Drainage class:* Very poorly drained

*Parent material:* Till overlying limestone or dolostone

*Landform:* Depressions, drainageways, and flats on ground moraines

*Slope range:* 0 to 1 percent

*Adjacent soils:* Blount, Glynwood, Milton, and Pewamo

*Taxonomic class:* Fine, mixed, active, mesic Typic Argiaquolls

### **Typical Pedon**

Millsdale silty clay loam, 0 to 1 percent slopes; in Allen County, Ohio; about 5 miles north of Spencerville; Spencer Township; about 1,820 feet south and 153 feet east of the northwest corner of sec. 13, T. 3 S., R. 4 E.

Ap1—0 to 6 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate coarse subangular blocky structure parting to moderate medium granular; firm; common fine and very fine roots; 1 percent angular gravel; neutral; abrupt smooth boundary.

Ap2—6 to 11 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium angular blocky structure parting to moderate fine and medium granular; friable; common fine and very fine roots; common faint very dark gray (10YR 3/1) organic coatings on vertical faces of peds; 1 percent angular gravel; neutral; abrupt smooth boundary.

Btg1—11 to 21 inches; very dark gray (10YR 3/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure parting to weak fine and very fine subangular blocky; friable; common fine and very fine roots; many distinct black (10YR 2/1) organo-clay films on faces of peds; few fine prominent light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; 2 percent subangular gravel; neutral; clear smooth boundary.

Btg2—21 to 25 inches; dark gray (5Y 4/1) silty clay; moderate medium subangular blocky structure; firm; common very fine and fine roots; common distinct dark gray (10YR 4/1) clay films on vertical faces of peds; many fine and medium prominent light olive brown (2.5Y 5/4) and few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 2 percent subangular and rounded gravel; strongly effervescent; moderately alkaline; abrupt wavy boundary.

2R—25 to 27 inches; white (10YR 8/1) dolomite.

### **Range in Characteristics**

*Thickness of the mollic epipedon:* 10 to 23 inches

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

*Ap horizon:*

Color—hue of 10YR or 2.5Y, value of 2, 2.5, or 3, and chroma of 1 or 2

Texture—silty clay loam

Content of rock fragments—0 to 14 percent

*Btg or Bt horizon:*

Color—hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2; chroma of 3 or 4 is included in the lower part of horizon

Texture—silty clay, silty clay loam, clay loam, or clay

Content of rock fragments—1 to 14 percent

## **Milton Series**

*Depth class:* Moderately deep

*Drainage class:* Moderately well drained

*Parent material:* Loamy glaciofluvial deposits overlying limestone or dolostone

*Landform:* Rises and flats on ground moraines

*Position on the landform:* Summits and shoulders

*Slope range:* 0 to 2 percent

*Adjacent soils:* Blount, Glynwood, Harrod, and Millsdale

*Taxonomic class:* Fine, mixed, active, mesic Typic Hapludalfs

### **Typical Pedon**

Milton loam, 0 to 2 percent slopes; in Allen County, Ohio; about 1 mile southeast of Bluffton; Richland Township; about 1,620 feet north and 1,280 feet west of the southeast corner of sec. 12, T. 2 S., R 8 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common medium and many fine roots; 1 percent rock fragments; moderately acid; abrupt smooth boundary.

Bt1—10 to 13 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular blocky structure; friable; many fine and common medium roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 2 percent rock fragments; slightly acid; clear smooth boundary.

Bt2—13 to 18 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; firm; many fine and common medium roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; 10 percent rock fragments; slightly acid; clear smooth boundary.

Bt3—18 to 23 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 10 percent rock fragments; neutral; clear wavy boundary.

Bt4—23 to 28 inches; yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 10 percent rock fragments; neutral; abrupt wavy boundary.

2R—28 inches; fractured dolostone.

### **Range in Characteristics**

*Thickness of the mollic epipedon:* 10 to 15 inches

*Thickness of the solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches

*Ap horizon:*

Color—hue of 10YR or 7.5YR and value and chroma of 2 or 3

Texture—loam

Content of rock fragments—0 to 5 percent

*Bt horizon (upper part):*

Color—hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6

Texture—loam, clay loam, or silty clay loam

Content of rock fragments—1 to 10 percent

*Bt horizon (lower part):*

Color—hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4

Texture—clay loam, silty clay, or clay

Content of rock fragments—2 to 14 percent

The Milton soils in Allen County are considered taxadjuncts to the series because they have a mollic epipedon, redoximorphic indicators within a depth of 100 centimeters (40 inches), and more sand and less clay in the Bt horizon than is defined in the range for the series. They classify as fine-loamy, mixed, active, mesic Oxyaquic Argiudolls, according to the 7th edition of "Keys to Soil Taxonomy." These differences, however, do not significantly affect the use and management of the soils.

## ***Nappanee Series***

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Till

*Landform:* Rises and flats on lake plains

*Position on the landform:* Summits and shoulders

*Slope range:* 0 to 2 percent

*Adjacent soils:* Hoytville

*Taxonomic class:* Fine, illitic, mesic Aeric Epiaqualfs

### **Typical Pedon**

Nappanee silty clay loam, 0 to 2 percent slopes; in Hancock County, Ohio; about 2 miles northwest of Deweyville; Pleasant Township; about 240 feet north and 1,460 feet west of the southeast corner of sec. 6, T. 2 N., R. 9 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, pale brown (10YR 6/3) dry; weak medium and coarse subangular blocky structure parting to moderate medium granular; firm; few medium and common fine roots; few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation lining the interior of pores; 10 percent intermixing of brown (10YR 5/3) material from the Bt horizon; 1 percent rock fragments; strongly acid; clear smooth boundary.

Bt—8 to 15 inches; brown (10YR 5/3) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few faint very dark grayish brown (10YR 3/2) masses of iron and manganese oxide accumulation on faces of peds; 1 percent rock fragments; strongly acid; gradual wavy boundary.

Btg1—15 to 24 inches; grayish brown (10YR 5/2) silty clay; strong fine and medium subangular blocky structure; firm; few fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common faint very dark grayish brown (10YR 3/2) masses of iron and manganese oxide

accumulation on faces of peds; 1 percent rock fragments; neutral; gradual wavy boundary.

**Btg<sub>2</sub>**—24 to 32 inches; grayish brown (10YR 5/2) silty clay; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct white (10YR 8/1) calcium carbonate concretions in the matrix; 2 percent rock fragments; slightly effervescent discontinuously in the matrix; slightly alkaline; gradual wavy boundary.

**B<sub>t</sub>**—32 to 40 inches; yellowish brown (10YR 5/4) clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine and very fine roots in the upper part of horizon; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct white (10YR 8/1) calcium carbonate concretions in the matrix; 2 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.

**BC**—40 to 56 inches; yellowish brown (10YR 5/4) clay loam; weak medium and coarse subangular blocky structure; very firm; common distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct white (10YR 8/1) calcium carbonate concretions in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

**Cd**—56 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive with widely spaced vertical fractures; very firm; few fine and medium distinct grayish brown (10YR 5/2) iron depletions oriented along fractures; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation oriented along fractures; few distinct very dark grayish brown (10YR 3/2) masses of iron and manganese oxide accumulation oriented along faces of fractures; few medium distinct white (10YR 8/1) calcium carbonate concretions in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 30 to 60 inches

*Depth to carbonates:* 18 to 40 inches

*Depth to densic material:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 to 5, and chroma of 1 to 3

Texture—clay loam

Content of rock fragments—0 to 5 percent

#### *Bt or Btg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—silty clay or clay

Content of rock fragments—1 to 10 percent

#### *BC or BCg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—clay loam, silty clay loam, clay, or silty clay

Content of rock fragments—2 to 10 percent

#### *Cd or Cd<sub>g</sub> horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4

Texture—clay loam, clay, silty clay, or silty clay loam

Content of rock fragments—2 to 10 percent

## ***Patton Series***

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Glaciolacustrine deposits

*Landform:* Depressions and drainageways on ground moraines

*Slope range:* 0 to 1 percent

*Adjacent soils:* Blount and Pewamo

*Taxonomic class:* Fine-silty, mixed, superactive, mesic Typic Endoaquolls

### **Typical Pedon**

Patton silty clay loam, 0 to 1 percent slopes; in Hancock County, Ohio; about 4.5 miles west of Benton Ridge; Blanchard Township; about 590 feet east and 2,580 feet south of the northwest corner of sec. 30, T. 1 N., R. 9 E.

- Ap—0 to 12 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate fine and medium granular; firm; common fine and few medium roots; neutral; clear smooth boundary.
- Bg1—12 to 20 inches; gray (10YR 5/1) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common distinct very dark gray (10YR 3/1) organic coatings on vertical faces of peds and in pores; common medium faint grayish brown (2.5Y 5/2) iron depletions in the matrix; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine faint very dark gray (10YR 3/1) moderately cemented iron and manganese oxide concretions in the matrix; neutral; gradual wavy boundary.
- Bg2—20 to 30 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common distinct very dark gray (10YR 3/1) organic coatings on vertical faces of peds and in pores; common medium prominent strong brown (7.5YR 5/6) and few medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark gray (10YR 3/1) moderately cemented iron and manganese oxide concretions in the matrix; neutral; gradual wavy boundary.
- Bg3—30 to 35 inches; gray (10YR 5/1) silty clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings in pores; few faint dark gray (10YR 4/1) coatings on vertical faces of peds; many medium and coarse prominent strong brown (7.5YR 5/6) and few medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark gray (10YR 3/1) moderately cemented iron and manganese oxide concretions in the matrix; slightly alkaline; clear wavy boundary.
- Bg4—35 to 48 inches; gray (10YR 5/1) silty clay loam that has strata of silt loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings in pores; few faint gray (10YR 5/1) coatings on vertical faces of peds; many medium distinct dark yellowish brown (10YR 4/4) and common medium and coarse prominent (7.5YR 5/6) masses of iron accumulation in the matrix; common fine faint very dark gray (10YR 3/1) moderately cemented iron and manganese oxide concretions in the matrix; slightly alkaline; gradual wavy boundary.
- BCg—48 to 59 inches; gray (10YR 5/1) silt loam that has strata of silty clay loam and loam; weak medium and coarse subangular blocky structure; friable; few fine roots;

few faint gray (10YR 5/1) coatings on vertical faces of peds; many medium distinct yellowish brown (10YR 5/4) and common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; slightly alkaline; clear wavy boundary.

C—59 to 80 inches; yellowish brown (10YR 5/4) silt loam that has strata of loamy fine sand and loamy sand; massive; friable; common medium and coarse distinct dark gray (10YR 4/1) iron depletions in the matrix; few medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; 5 percent rock fragments in loamy sand strata; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 18 inches

*Thickness of the solum:* 24 to 48 inches

*Depth to carbonates:* 10 to 30 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2

Texture—silty clay loam

Content of rock fragments—0 to 5 percent

#### *Bg horizon:*

Color—horizon has hue of 10YR to 5Y or is neutral in hue, has value of 4 or 5, and has chroma of 0 to 2

Texture—silty clay loam, silty clay, or silt loam

Content of rock fragments—0 to 5 percent

#### *BCg, C, or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2

Texture—silt loam or silty clay loam; horizon is commonly stratified with thin strata of coarser or finer textures

Content of rock fragments—0 to 5 percent

#### *2Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2

Texture—sandy loam, loam, fine sandy loam, or gravelly sandy loam; horizon is commonly stratified

Content of rock fragments—5 to 35 percent

## **Pewamo Series**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Till

*Landform:* Depressions and drainageways on ground moraines and end moraines

*Slope range:* 0 to 2 percent

*Adjacent soils:* Blount and Glynwood

*Taxonomic class:* Fine, mixed, active, mesic Typic Argiaquolls (fig. 19)

### Typical Pedon

Pewamo silty clay loam, 0 to 1 percent slopes; in Allen County, Ohio; about 4 miles northeast of Spencerville; Amanda Township; about 944 feet south and 472 feet east of the northwest corner of sec. 34, T. 3 S., R. 5 E.

Ap1—0 to 5 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown



**Figure 19.—Profile of a Pewamo soil. Organic matter darkens the surface, and the reduction of iron is responsible for the gray colors in the subsoil. Depth is marked in feet. (Photo from Hancock County, Ohio)**

(10YR 5/2) dry; moderate fine and medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Ap2—5 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak coarse subangular blocky structure parting to moderate fine and medium granular; friable; few fine roots; few fine faint dark gray (10YR 4/1) and gray (10YR 5/1) iron depletions in the lower part of horizon; few fine distinct light olive brown (2.5Y 5/4) and prominent yellowish brown (10YR 5/6) masses of iron accumulation in the lower part of horizon; neutral; abrupt smooth boundary.

- Btg1—12 to 18 inches; dark grayish brown (2.5Y 4/2) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; common medium faint dark gray (10YR 4/1) iron depletions in the matrix; common medium prominent yellowish brown (10YR 5/6) and common medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few distinct black (N 2.5/0) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear smooth boundary.
- Btg2—18 to 25 inches; dark gray (10YR 4/1) silty clay; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many faint dark gray (10YR 4/1) clay films on faces of peds; common medium prominent yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few distinct black (N 2.5/0) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear wavy boundary.
- Btg3—25 to 31 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; many faint dark gray (10YR 4/1) clay films on faces of peds; few medium prominent yellowish brown (10YR 5/6) and common medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few distinct black (N 2.5/0) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear wavy boundary.
- Btg4—31 to 43 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common faint dark gray (10YR 4/1) clay films on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few distinct black (N 2.5/0) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; gradual wavy boundary.
- Bt—43 to 52 inches; yellowish brown (10YR 5/4) silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; few fine distinct gray (10YR 6/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few prominent black (N 2.5/0) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; gradual wavy boundary.
- BC—52 to 70 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium and coarse subangular blocky structure; very firm; few fine roots; common distinct gray (10YR 5/1) carbonate coatings on vertical faces of peds; common distinct light gray (10YR 7/1) carbonate coatings on horizontal faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine prominent black (N 2.5/0) masses of manganese accumulation in the matrix; 5 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.
- C—70 to 80 inches; brown (10YR 5/3) silty clay loam; massive with widely spaced vertical fractures; very firm; common distinct gray (10YR 5/1) carbonate coatings on faces of fractures; common medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; common fine distinct black (N 2.5/0) masses of manganese accumulation in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 17 inches

*Thickness of the solum:* 28 to 70 inches

*Depth to carbonates:* 28 to 60 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2

Texture—silty clay loam

Content of rock fragments—0 to 10 percent

*Btg or Bt horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4

Texture—silty clay, clay, silty clay loam, or clay loam

Content of rock fragments—1 to 10 percent

*C or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 14 percent

## ***Rensselaer Series***

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Generally loamy deposits; in the till substratum phase, loamy deposits overlying till

*Landform:* Flats, drainageways and depressions on glacial drainage channels, deltas on lake plains, outwash plains, lake plains, and ground moraines

*Slope range:* 0 to 1 percent

*Adjacent soils:* Blount, Houcktown, Pewamo, and Westland

*Taxonomic class:* Fine-loamy, mixed, superactive, mesic Typic Argiaquolls

### **Typical Pedon**

Rensselaer loam, till substratum, 0 to 1 percent slopes; in Allen County, Ohio; about 4.9 miles northwest of Bluffton; Richland Township; about 440 feet south and 1,375 feet west of the northeast corner of sec. 31, T. 1 S., R. 8 E.

Ap1—0 to 7 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; many fine and very fine and common medium roots; few fine faint black (10YR 2/1) masses of manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear smooth boundary.

Ap2—7 to 13 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure; friable; common very fine to medium roots; common fine prominent light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few fine faint black (10YR 2/1) masses of manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear smooth boundary.

Btg1—13 to 19 inches; dark gray (10YR 4/1) sandy clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine and few medium roots; many faint very dark gray (10YR 3/1) clay films on faces of peds; very few prominent brown (7.5YR 4/4) masses of iron accumulation on faces of peds; common fine prominent light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few fine faint black (10YR 2/1) masses of manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.

Btg2—19 to 28 inches; gray (10YR 5/1) clay loam; moderate coarse prismatic

structure parting to moderate medium and coarse subangular blocky; firm; common fine and very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; common fine prominent light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) and few fine prominent brownish yellow (10YR 6/8) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.

Btg3—28 to 38 inches; grayish brown (2.5Y 5/2) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; common fine distinct light olive brown (2.5Y 5/4), common fine prominent yellowish brown (10YR 5/6), and few fine prominent brownish yellow (10YR 6/8) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 2 percent rock fragments; neutral; clear smooth boundary.

Btg4—38 to 48 inches; grayish brown (2.5Y 5/2) sandy clay loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; few distinct dark gray (10YR 4/1) and common distinct gray (10YR 5/1) clay films on faces of peds; common fine and medium distinct light olive brown (2.5Y 5/4) and common medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 4 percent rock fragments; slightly alkaline; clear wavy boundary.

Btg5—48 to 55 inches; grayish brown (2.5Y 5/2) sandy clay loam; weak medium and coarse subangular blocky structure; friable; few fine and very fine roots; common distinct gray (10YR 5/1) clay films on faces of peds; common fine and medium distinct light olive brown (2.5Y 5/4) and common medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 5 percent rock fragments; slightly alkaline; clear wavy boundary.

BCg—55 to 60 inches; grayish brown (2.5Y 5/2) loam that has thin strata of silt loam; weak medium and coarse subangular blocky structure; friable; few fine and very fine roots; few distinct dark gray (10YR 4/1) clay bridging between sand grains; common fine distinct light olive brown (2.5Y 5/4) and few fine prominent brownish yellow (10YR 6/8) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 4 percent rock fragments; slightly alkaline; clear wavy boundary.

Cg1—60 to 71 inches; dark gray (10YR 4/1) stratified sandy loam that has loamy sand; massive; friable; 5 percent rock fragments; slightly effervescent; slightly alkaline; abrupt smooth boundary.

2Cg2—71 to 80 inches; dark gray (10YR 4/1) clay loam; massive; firm; 5 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 20 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 40 to 60 inches

*Depth to till:* Generally more than 80 inches; in the till substratum phase, 60 to 80 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2

Texture—loam or silt loam

Content of rock fragments—0 to 5 percent

*Btg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2; chroma of 3 or 4 is included in the lower part of horizon

Texture—loam, clay loam, silty clay loam, sandy clay loam, sandy loam, or fine sandy loam

Content of rock fragments—0 to 5 percent

*Cg or C horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4

Texture—loamy sand, loamy fine sand, sandy loam, loam, silt loam, or sand; horizon is commonly stratified

Content of rock fragments—0 to 10 percent

*2C or 2Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 7 percent

**Roundhead Series**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Thin layer of organic material and the underlying clayey and silty glaciolacustrine deposits, over loamy and gravelly glaciofluvial deposits

*Landform:* Depressions on ground moraines

*Slope range:* 0 to 1 percent

*Adjacent soils:* Blount, Eldean, Millsdale, and Shoals

*Taxonomic class:* Fine-silty, mixed, superactive, calcareous, mesic Histic Humaquepts

**Typical Pedon**

Roundhead muck; in Hardin County, Ohio; about 2.5 miles south of McGuffey; McDonald Township; about 4,370 feet south of the intersection of State Route 195 and County Road 65, about 165 feet east:

Oap—0 to 10 inches; black (10YR 2/1) broken face and rubbed muck (sapric material) that has very little fiber, very dark gray (10YR 3/1) dry; moderate fine and medium granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.

Bg1—10 to 16 inches; dark grayish brown (2.5Y 4/2) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; black (10YR 2/1) wormcasts and common distinct black (10YR 2/1) organic coatings on vertical faces of peds; common medium faint gray (5Y 5/1) iron depletions in the matrix; common medium prominent white (10YR 8/1) aquatic shells in the matrix; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bg2—16 to 23 inches; grayish brown (2.5Y 5/2) silt loam that has thin strata of silt and very fine sand; weak coarse prismatic structure parting to weak medium subangular blocky; friable; common prominent yellowish brown (10YR 5/6) iron oxide coatings in old root channels; common medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; common medium distinct light gray (10YR 7/2) gypsum crystals ( $\text{CaSO}_4$ ) in old root channels; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bg3—23 to 37 inches; gray (5Y 5/1) silty clay loam; weak medium and coarse subangular blocky structure; firm; common prominent yellowish brown (10YR 5/4) iron oxide coatings in old root channels; common medium prominent olive brown (2.5Y 4/4) and common medium faint dark grayish brown (2.5Y 4/2) masses of

iron accumulation in the matrix; common medium prominent light gray (10YR 7/2) gypsum crystals ( $\text{CaSO}_4$ ) in old root channels; strongly effervescent; slightly alkaline; gradual smooth boundary.

Cg—37 to 60 inches; gray (5Y 5/1) silty clay loam that has strata of silt loam; massive; weakly laminated; firm; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the histic epipedon:* 8 to 15 inches

*Thickness of the solum:* 15 to 30 inches

*Depth to carbonates:* 15 to 30 inches

*Depth to bedrock:* More than 80 inches

*Oap or Oa horizon:*

Color—hue of 10YR or 7.5YR, value of 2, 2.5, or 3, and chroma of 1 or 2

Texture—muck (sapric material)

*Bg horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2

Texture—silty clay loam or silty clay

Content of rock fragments—0 to 5 percent

*2Cg horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2

Texture—stratified loam, sandy loam, very fine sandy loam, or loamy fine sand or the gravelly analogues of those textures

Content of rock fragments—0 to 10 percent; can be as much as 20 percent in individual strata

The Roundhead soils in Allen County are considered taxadjuncts to the series because they are not calcareous in the Bg horizon. They classify as fine-silty, mixed, superactive, nonacid, mesic Histic Humaquepts, according the 7th edition of the “Keys to Soil Taxonomy.” This difference, however, does not significantly affect the use and management of the soils.

## Saranac Series

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Generally clayey alluvium; in the till substratum phase, clayey alluvium overlying till

*Landform:* Backswamps and flats on flood plains

*Slope range:* 0 to 1 percent

*Adjacent soils:* Harrod, Rensselaer, and Sloan

*Taxonomic class:* Fine, mixed, active, mesic Fluvaquentic Endoaquolls

### Typical Pedon

Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded; in Allen County, Ohio; about 6 miles southeast of Lima; Perry Township; about 1,800 feet west and 2,600 feet south of the northeast corner of sec. 23, T. 4 S., R. 7 E.

Ap1—0 to 4 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; weak fine and medium subangular blocky structure; firm; common medium to very fine roots; 1 percent rock fragments; neutral; clear smooth boundary.

Ap2—4 to 11 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR

- 5/2) dry; moderate coarse angular blocky structure parting to moderate medium angular blocky; firm; common fine and very fine roots; 1 percent rock fragments; neutral; clear smooth boundary.
- Bg1—11 to 18 inches; dark gray (10YR 4/1) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine and very fine roots; common faint dark gray (10YR 4/1) pressure faces on faces of peds; common fine and medium prominent brown (7.5YR 4/4) masses of iron accumulation in the matrix; few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear smooth boundary.
- Bg2—18 to 24 inches; dark gray (5Y 4/1) silty clay; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; common fine and very fine roots; common faint dark gray (10YR 4/1) pressure faces on faces of peds; common fine and medium prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few prominent black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear smooth boundary.
- Bg3—24 to 30 inches; dark gray (5Y 4/1) silty clay; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; common fine and very fine roots; many faint dark gray (10YR 4/1) pressure faces on faces of peds; common fine prominent yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few prominent black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear wavy boundary.
- Bg4—30 to 37 inches; grayish brown (2.5Y 5/2) silty clay; moderate fine and medium subangular blocky structure; firm; common fine and very fine roots; many distinct gray (10YR 5/1) pressure faces on faces of peds; many fine and medium distinct light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few prominent black (10YR 2/1) masses of manganese accumulation on faces of peds; neutral; clear wavy boundary.
- Bg5—37 to 51 inches; gray (5Y 5/1) silty clay; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; firm; common fine and very fine roots; common faint dark gray (10YR 4/1) pressure faces on faces of peds; common fine and medium prominent light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few prominent black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear wavy boundary.
- Bg6—51 to 64 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine and very fine roots; common distinct gray (10YR 5/1) pressure faces on faces of peds; common fine and medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few prominent black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; gradual wavy boundary.
- BCg—64 to 67 inches; gray (10YR 5/1) clay loam; weak medium subangular blocky structure; friable; common fine and medium prominent yellowish brown (10YR 5/6) and common fine prominent light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; 5 percent rock fragments; slightly effervescent; slightly alkaline; gradual wavy boundary.
- Cg—67 to 80 inches; dark grayish brown (10YR 4/2) stratified silty clay loam and silt loam; massive with vertical fractures; friable; common distinct gray (10YR 6/1) clay depletions on faces of fractures with common distinct brown (10YR 5/3) hypocoats along the gray clay depletions; common fine and medium distinct light olive brown

(2.5Y 5/4) masses of iron accumulation in the matrix; few faint black (10YR 2/1) masses of manganese accumulation on faces of fractures; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 14 inches

*Thickness of the solum:* 40 to 72 inches

*Depth to carbonates:* 40 to 72 inches

*Depth to till:* Generally more than 80 inches; in the till substratum phase, 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 1 or 2

Texture—silty clay loam

Content of rock fragments—0 to 5 percent

#### *Bg or Bw horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2; chroma of 3 or 4 is included in the lower part of horizon

Texture—silty clay loam, silty clay, clay loam, or clay

Content of rock fragments—0 to 5 percent

#### *Cg horizon:*

Color—hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2

Texture—silty clay loam, clay loam, or silt loam; horizon is commonly stratified

Content of rock fragments—0 to 5 percent

#### *2C horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 7 percent

## Seward Series

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Sandy and loamy glaciolacustrine deposits and the underlying till

*Landform:* Knolls and rises on ground moraines

*Position on the landform:* Backslopes, shoulders, and summits

*Slope range:* 0 to 5 percent

*Adjacent soils:* Arkport, Blount, Pewamo, and Rensselaer

*Taxonomic class:* Coarse-loamy over clayey, mixed, active, mesic Oxyaquic Hapludalfs

### Typical Pedon

Seward loamy fine sand, 2 to 6 percent slopes; in Henry County, Ohio; about 1 mile southwest of Ridgeville Corners; Ridgeville Township; about 1,200 feet west and 300 feet north of the southeast corner of sec. 34, T. 6 N., R. 5 E.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

E1—10 to 21 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; common fine roots; few fine faint dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix in the lower part of horizon; slightly acid; clear wavy boundary.

- E2—21 to 26 inches; brown (7.5YR 4/4) loamy fine sand; weak medium subangular blocky structure; very friable; few fine roots; many fine distinct pale brown (10YR 6/3) iron depletions in the matrix; many fine faint yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; few prominent black (5YR 2.5/1) iron and manganese oxide stains on faces of peds; slightly acid; gradual wavy boundary.
- Bt1—26 to 34 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common distinct brown (10YR 4/3) clay films on faces of peds and in pores; many medium faint pale brown (10YR 6/3) iron depletions in the matrix; many medium faint brown (7.5YR 4/4) masses of iron accumulation in the matrix; neutral; abrupt smooth boundary.
- 2Bt2—34 to 40 inches; dark yellowish brown (10YR 4/4) clay; moderate medium subangular blocky structure; very firm; common distinct dark brown (10YR 3/3) clay films on faces of peds; many fine prominent gray (5Y 6/1) iron depletions in the matrix; many fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 4 percent rock fragments; slightly alkaline; gradual wavy boundary.
- 2Cd—40 to 80 inches; brown (10YR 4/3) clay; massive with widely spaced vertical fractures; very firm; many prominent gray (5Y 5/1) and greenish gray (5GY 6/1) coatings; few distinct light gray (10YR 7/1) masses of calcium carbonate accumulation on faces of vertical fractures; common fine distinct gray (10YR 6/1) iron depletions in the matrix; 4 percent rock fragments; slightly effervescent; moderately alkaline.

#### **Range in Characteristics**

*Thickness of the sandy material:* 20 to 32 inches

*Thickness of the solum:* 40 to 65 inches

*Depth to carbonates:* 40 to 65 inches

*Depth to till:* 40 to 60 inches

*Depth to densic material:* 40 to 65 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 1 to 4

Texture—loamy fine sand

Content of rock fragments—0 to 3 percent

#### *E horizon:*

Color—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6

Texture—loamy fine sand or loamy sand

Content of rock fragments—0 to 3 percent

#### *Bt horizon:*

Color—hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4

Texture—sandy clay loam, silty clay loam, sandy loam, or loam

Content of rock fragments—0 to 3 percent

#### *2Bt or 2BC horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4

Texture—silty clay loam or clay loam

Content of rock fragments—1 to 8 percent

#### *2Cd or 2Cdg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—silty clay loam or clay loam

Content of rock fragments—1 to 8 percent

The Seward soils in Allen County are considered taxadjuncts to the series because they have more clay in the particle-size control section than is defined in the range for the series. They classify as fine-loamy, mixed, active, mesic Oxyaquic Hapludalfs, according the 7th edition of "Keys to Soil Taxonomy." This difference, however, does not significantly affect the use and management of the soils.

## **Shawtown Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Stratified water-sorted deposits overlying till

*Landform:* Knolls on beach ridges on lake plains, ground moraines, glacial drainage channels, stream terraces, and outwash plains

*Position on the landform:* Backslopes, shoulders, summits, and risers

*Slope range:* 2 to 6 percent

*Adjacent soils:* Alvada, Aurand, Cygnet, and Hoytville

*Taxonomic class:* Fine-loamy, mixed, active, mesic Oxyaquic Hapludalfs

### **Typical Pedon**

Shawtown loam, 2 to 6 percent slopes; in Hancock County, Ohio; about 1 mile west of McComb; Pleasant Township; about 2,280 feet east and 280 feet south of the northwest corner of sec. 27, T. 2 N., R. 9 E.

Ap—0 to 9 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; few fine roots; 5 percent rock fragments; strongly acid; abrupt smooth boundary.

Bt1—9 to 21 inches; dark yellowish brown (10YR 4/4) loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; 10 percent rock fragments; strongly acid; gradual wavy boundary.

Bt2—21 to 33 inches; dark yellowish brown (10YR 4/4) gravelly clay loam that has strata of clay loam; moderate medium subangular blocky structure; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; 15 percent rock fragments; neutral; clear wavy boundary.

Bt3—33 to 48 inches; yellowish brown (10YR 5/4) gravelly loam; moderate medium subangular blocky structure; friable; few fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few medium distinct grayish brown (10YR 5/2) and common medium faint brown (10YR 5/3) iron depletions in the matrix; 20 percent rock fragments; neutral; clear wavy boundary.

Bt4—48 to 55 inches; brown (10YR 5/3) gravelly loam that has strata of gravelly sandy loam; weak medium and coarse subangular blocky structure; very friable; common faint brown (10YR 5/3) clay films on faces of peds and as bridging between sand grains; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 20 percent rock fragments; slightly effervescent discontinuously in the lower part of horizon; neutral; clear wavy boundary.

Cg—55 to 63 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand that has strata of loamy sand; single grain; loose; few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 20 percent rock fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

2Cd—63 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive with widely spaced vertical fractures; very firm; common fine distinct gray (10YR 5/1) iron depletions oriented along fractures; 5 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 35 to 60 inches

*Depth to carbonates:* 35 to 60 inches

*Depth to till:* 50 to 70 inches

*Depth to densic material:* 50 to 70 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—loam

Content of rock fragments—1 to 14 percent

*Bt horizon:*

Color—hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6

Texture—loam, clay loam, sandy clay loam, sandy loam, or coarse sandy loam or the gravelly analogues of those textures

Content of rock fragments—5 to 25 percent

*C or Cg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 1 to 4

Texture—loamy sand, loamy coarse sand, coarse sandy loam, or sandy loam or the gravelly or very gravelly analogues of those textures

Content of rock fragments—5 to 45 percent

*2Cd or 2Cdg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Texture—clay loam, silt loam, or silty clay loam

Content of rock fragments—1 to 7 percent

## Shinrock Series

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Till overlying glaciolacustrine deposits

*Landform:* Dissected areas along streams on lake plains

*Position on the landform:* Backslopes and shoulders

*Slope range:* 6 to 12 percent

*Adjacent soils:* Hoytville and Nappanee

*Taxonomic class:* Fine, illitic, mesic Aquic Hapludalfs

### Typical Pedon

Shinrock silt loam, 2 to 6 percent slopes; in Marion County, Ohio; about 1.7 miles northwest of Morral; Salt Rock Township; about 1,240 feet east and 2,150 feet south of the northwest corner of sec. 15, T. 4 S., R. 14 E.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; friable; common fine and very fine roots; moderately acid; abrupt smooth boundary.

Bt1—9 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine and very fine roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct dark yellowish brown (10YR 4/4) coatings on faces of peds; few medium faint brown (10YR 5/3) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; strongly acid; clear wavy boundary.

Bt2—12 to 25 inches; yellowish brown (10YR 5/4) silty clay; moderate medium and

coarse angular blocky structure; firm; few fine roots; few faint brown (10YR 5/3) clay films on faces of peds; common distinct grayish brown (10YR 5/2) coatings on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine prominent black (N 2.5/0) manganese oxide concretions in the matrix; strongly acid; gradual wavy boundary.

**Bt3**—25 to 37 inches; olive brown (2.5Y 4/4) silty clay; moderate coarse subangular blocky structure; firm; few fine roots; few faint brown (10YR 5/3) clay films on faces of peds; common prominent gray (10YR 5/1) coatings on faces of peds; common medium distinct grayish brown (2.5Y 5/2) iron depletions in the matrix; few fine prominent black (N 2.5/0) manganese oxide concretions in the matrix; moderately acid; clear wavy boundary.

**C**—37 to 60 inches; light olive brown (2.5Y 5/4) silty clay loam; massive with widely spaced vertical fractures; firm; common distinct grayish brown (2.5Y 5/2) coatings on vertical faces of fractures; common medium distinct light olive brown (2.5Y 5/6) masses of iron accumulation in the matrix; common medium distinct pale yellow (2.5Y 8/2) calcium carbonate nodules in the matrix; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 20 to 55 inches

*Depth to carbonates:* 16 to 38 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 4, and chroma of 2 or 3

Texture—clay loam

Content of rock fragments—0 to 5 percent

#### *Bt horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 3 to 6

Texture—silty clay, silty clay loam, clay, or clay loam

Content of rock fragments—0 to 5 percent

#### *C horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4

Texture—silty clay loam or silt loam

Content of rock fragments—0 to 5 percent

## Shoals Series

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Generally loamy alluvium; in the till substratum phase, loamy alluvium overlying till

*Landform:* Flats on flood plains

*Slope range:* 0 to 1 percent

*Adjacent soils:* Knoxdale and Lybrand

*Taxonomic class:* Fine-loamy, mixed, superactive, nonacid, mesic Aeric Fluvaquents

### Typical Pedon

Shoals silt loam, 0 to 1 percent slopes, occasionally flooded; in Allen County, Ohio; about 3.5 miles east of Spencerville; Amanda Township; about 1,580 feet east and 1,000 feet north of the southwest corner of sec. 10, T. 4 S., R. 5 E.

- Ap1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; very few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; slightly acid; clear smooth boundary.
- Ap2—5 to 12 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; very few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; slightly acid; abrupt smooth boundary.
- Bg1—12 to 20 inches; dark gray (10YR 4/1) silty clay loam; moderate fine subangular blocky structure; friable; common fine and very fine roots; few faint very dark gray (10YR 3/1) organic coatings on vertical faces of peds; common fine prominent brown (7.5YR 4/4) and light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; very few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear smooth boundary.
- Bg2—20 to 28 inches; dark gray (10YR 4/1) silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine and very fine roots; common faint very dark gray (10YR 3/1) organic coatings on vertical faces of peds; common fine and medium prominent strong brown (7.5YR 5/6) and light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; very few faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 1 percent rock fragments; neutral; clear wavy boundary.
- Bg3—28 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; common fine and very fine roots; common distinct dark gray (10YR 4/1) coatings on vertical faces of peds; very few prominent yellowish brown (10YR 5/6) masses of iron accumulation on faces of peds; common fine and medium prominent yellowish brown (10YR 5/6) and common fine distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.
- Bw1—36 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; few fine and very fine roots; common distinct dark gray (10YR 4/1) coatings on vertical faces of peds; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium faint brown (7.5YR 4/4) and common fine faint light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.
- Bw2—43 to 50 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine and medium subangular blocky structure; friable; few fine and very fine roots; common distinct dark gray (10YR 4/1) coatings on vertical faces of peds; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 1 percent rock fragments; neutral; gradual wavy boundary.
- BC—50 to 63 inches; light olive brown (2.5Y 5/4) clay loam; weak medium and coarse subangular blocky structure; friable; common distinct dark gray (10YR 4/1) coatings on vertical faces of peds; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; very few fine and medium prominent black (10YR 2/1) masses of manganese accumulation in the matrix; slightly alkaline; gradual wavy boundary.
- Cg—63 to 80 inches; dark gray (10YR 4/1) stratified silt loam, fine sandy loam, and

loam; massive; friable; 1 percent rock fragments; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 40 to 70 inches

*Depth to carbonates:* 60 to more than 80 inches

*Depth to till:* Generally more than 80 inches; in the till substratum phase, 60 to 80 inches

*Depth to bedrock:* More than 80 inches

*Ap horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 2 or 3

Texture—silt loam

Content of rock fragments—0 to 3 percent

*Bg or Bw horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—silty clay loam, silt loam, clay loam, or loam

Content of rock fragments—0 to 3 percent

*C or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 6

Texture—loam, sandy loam, fine sandy loam, or silt loam; horizon is commonly stratified

Content of rock fragments—0 to 14 percent

*2C or 2Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 7 percent

## Sleeth Series

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Outwash

*Landform:* Rises and flats on outwash plains and stream terraces

*Position on the landform:* Summits on outwash plains and treads on stream terraces

*Slope range:* 0 to 2 percent

*Adjacent soils:* Thackery and Westland

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aeric Endoaqualfs

### Typical Pedon

Sleeth silt loam, 0 to 2 percent slopes; in Allen County, Ohio; about 6.4 miles southeast of Lima; Perry Township; about 2,800 feet south and 210 feet west of the northeast corner of sec. 32, T. 4 S., R. 7 E.

Ap1—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; friable; many fine and very fine roots; few fine faint black (10YR 2/1) masses of manganese accumulation on faces of peds; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

Ap2—6 to 11 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; many fine and very fine roots; few fine faint black (10YR 2/1)

- masses of manganese accumulation on faces of peds; 2 percent rock fragments; moderately acid; abrupt smooth boundary.
- B<sub>Eg</sub>—11 to 14 inches; grayish brown (10YR 5/2) clay loam; moderate fine subangular blocky structure; friable; common fine and very fine roots; few distinct dark grayish brown (10YR 4/2) organic coatings in root channels and pores; common fine distinct yellowish brown (10YR 5/4) and few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; few fine distinct black (10YR 2/1) moderately cemented manganese concretions in the matrix; 2 percent rock fragments; slightly acid; clear smooth boundary.
- B<sub>tg</sub>—14 to 19 inches; grayish brown (10YR 5/2) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/4) and few fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; few fine distinct black (10YR 2/1) moderately cemented manganese concretions in the matrix; 5 percent rock fragments; slightly acid; clear wavy boundary.
- B<sub>t1</sub>—19 to 27 inches; yellowish brown (10YR 5/4) clay loam that has strata of sandy clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; few fine distinct black (10YR 2/1) moderately cemented manganese concretions in the matrix; 5 percent rock fragments; slightly acid; clear smooth boundary.
- B<sub>t2</sub>—27 to 34 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct light brownish gray (10YR 6/2) clay films on faces of peds; common fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; 5 percent rock fragments; slightly acid; clear wavy boundary.
- B<sub>t3</sub>—34 to 40 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; few fine and very fine roots; common distinct dark gray (10YR 4/1) and grayish brown (10YR 5/2) clay films on faces of peds; few fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; 5 percent rock fragments; neutral; clear smooth boundary.
- B<sub>t4</sub>—40 to 46 inches; yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; friable; few fine and very fine roots; common distinct grayish brown (10YR 5/2) and dark gray (10YR 4/1) clay films on faces of peds; few fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) masses of manganese accumulation on faces of peds; few fine distinct black (10YR 2/1) moderately cemented manganese concretions in the matrix; 5 percent rock fragments; neutral; abrupt smooth boundary.
- B<sub>Cg</sub>—46 to 59 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium and

coarse subangular blocky structure; very friable; common fine and medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 5 percent rock fragments; slightly alkaline; clear smooth boundary.

Cg1—59 to 73 inches; dark gray (10YR 4/1) loamy sand; single grain; loose; 10 percent rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg2—73 to 80 inches; dark gray (10YR 4/1) loamy sand that has strata of gravelly loamy sand; single grain; loose; 5 percent rock fragments in the loamy sand and 20 percent rock fragments in the gravelly loamy sand; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 4, and chroma of 2 or 3

Texture—silt loam

Content of rock fragments—0 to 10 percent

#### *Btg and Bt horizons:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—clay loam, loam, or sandy clay loam

Content of rock fragments—0 to 10 percent

#### *BCg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2

Texture—sandy loam, sandy clay loam, or loam

Content of rock fragments—0 to 10 percent

#### *Cg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 1 or 2

Texture—loamy sand, loamy coarse sand, gravelly loamy coarse sand, or gravelly loamy sand

Content of rock fragments—2 to 30 percent

## Sloan Series

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Generally loamy alluvium; in the till substratum phase, loamy alluvium overlying till

*Landform:* Backswamps and flats on flood plains

*Slope range:* 0 to 1 percent

*Adjacent soils:* Knoxdale and Shoals

*Taxonomic class:* Fine-loamy, mixed, superactive, mesic Fluvaquentic Endoaquolls

### Typical Pedon

Sloan silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded; in Allen County, Ohio; about 3.25 miles southwest of Westminster; Perry Township; about 2,130 feet north and 1,000 feet east of the southwest corner of sec. 26, T. 4 S., R. 7 E.

Ap—0 to 14 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; weak fine and medium subangular blocky structure; firm; common fine

and very fine roots; few fine faint dark gray (10YR 4/1) iron depletions in the lower part of horizon; 2 percent rock fragments; neutral; clear smooth boundary.

Bg1—14 to 22 inches; dark gray (10YR 4/1) clay loam; moderate medium subangular blocky structure; firm; common fine and very fine roots; common faint dark gray (10YR 4/1) organic coatings on faces of peds; common fine prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint black (10YR 2/1) masses of manganese accumulation in the matrix; 2 percent rock fragments; neutral; clear smooth boundary.

Bg2—22 to 33 inches; grayish brown (2.5Y 5/2) clay loam; moderate medium subangular blocky structure; firm; common fine and very fine roots; common distinct dark grayish brown (10YR 4/2) coatings on faces of peds; many fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 2 percent rock fragments; neutral; clear smooth boundary.

Bg3—33 to 39 inches; grayish brown (2.5Y 5/2) clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common distinct dark grayish brown (10YR 4/2) coatings on vertical faces of peds; many fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 2 percent rock fragments; neutral; clear smooth boundary.

Bw—39 to 46 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark gray (10YR 4/1) coatings on vertical faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct black (10YR 2/1) masses of manganese accumulation in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

Bg—46 to 58 inches; grayish brown (2.5Y 5/2) clay loam; weak medium subangular blocky structure; firm; few fine roots; common faint gray (10YR 5/1) coatings on vertical faces of peds; common fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 5 percent rock fragments; neutral; gradual wavy boundary.

Cg1—58 to 62 inches; dark gray (10YR 4/1) fine sandy loam; massive; very friable; very slightly effervescent; slightly alkaline; abrupt smooth boundary.

2Cg2—62 to 80 inches; dark gray (10YR 4/1) clay loam; massive with vertical fractures; firm; few distinct gray (10YR 5/1) coatings on faces of fractures; 5 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 23 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 45 to more than 80 inches

*Depth to till:* Generally more than 80 inches; in the till substratum phase, 60 to 80 inches

*Depth to bedrock:* More than 80 inches

### *Ap horizon:*

Color—hue of 10YR or 2.5Y, value of 2, 2.5, or 3, and chroma of 1 or 2

Texture—silty clay loam

Content of rock fragments—0 to 5 percent

*Bg or Bw horizon:*

Color—horizon has hue of 10YR to 5Y or is neutral in hue, has value of 4 or 5, and has chroma of 0 to 2; chroma of 3 or 4 is included in the lower part of horizon

Texture—clay loam, silty clay loam, loam, or silt loam

Content of rock fragments—0 to 5 percent

*C or Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—clay loam, silty clay loam, loam, sandy loam, or fine sandy loam or the gravelly analogues of those textures

Content of rock fragments—0 to 20 percent

*2C or 2Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—clay loam or silty clay loam

Content of rock fragments—1 to 7 percent

**Thackery Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Outwash

*Landform:* Knolls, flats, and rises on outwash plains and stream terraces

*Position on the landform:* Backslopes, shoulders, summits, treads, and risers

*Slope range:* 0 to 3 percent

*Adjacent soils:* Sleeth and Westland

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aquic Hapludalfs

**Typical Pedon**

Thackery silt loam, 0 to 2 percent slopes; in Greene County, Ohio; about 1.6 miles north of Xenia on Ohio Route 68; Xenia Township; about  $\frac{1}{3}$  mile east of the intersection of Route 68 and Township Road T88 (Kinsey Road):

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; moderately acid; abrupt smooth boundary.

E—8 to 12 inches; brown (10YR 5/3) silt loam; weak medium platy structure; friable; few fine faint grayish brown (10YR 5/2) iron depletions; few fine faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; dark grayish brown (10YR 4/2) wormcasts; moderately acid; abrupt smooth boundary.

Bt1—12 to 18 inches; brown (10YR 5/3) silt loam; moderate fine subangular blocky structure; friable; few faint brown (10YR 4/3) clay films on faces of peds; few fine faint grayish brown (10YR 5/2) iron depletions on faces of peds; moderately acid; clear smooth boundary.

2Bt2—18 to 26 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common faint brown (10YR 4/3) clay films on faces of peds; few fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 5 percent gravel; strongly acid; clear wavy boundary.

2Bt3—26 to 33 inches; brown (10YR 4/3) clay loam; moderate medium and coarse subangular blocky structure; firm; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine distinct black

(10YR 2/1) manganese concretions in the matrix; 5 percent gravel; slightly acid; clear wavy boundary.

2Btg—33 to 40 inches; grayish brown (10YR 5/2) clay loam; weak coarse subangular blocky structure; firm; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine faint gray (10YR 5/1) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; few fine distinct black (10YR 2/1) manganese concretions in the matrix; 10 percent gravel; neutral; abrupt wavy boundary.

2BC—40 to 50 inches; yellowish brown (10YR 5/4) very gravelly loam; weak coarse subangular blocky structure; friable; many medium distinct dark grayish brown (10YR 4/2) iron depletions in the matrix; many medium distinct light brownish gray (10YR 6/2) masses of calcium carbonate accumulation in the matrix; 55 percent gravel; strongly effervescent; slightly alkaline; gradual wavy boundary.

2C—50 to 72 inches; brown (10YR 5/3) extremely gravelly loamy sand; single grain; loose; 60 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the solum:* 55 to 70 inches

*Depth to carbonates:* 55 to 70 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 or 3

Texture—sandy loam or loam

Content of rock fragments—0 to 5 percent

#### *Bt or Btg horizon:*

Color—hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6

Texture—clay loam, loam, or sandy clay loam

Content of rock fragments—0 to 10 percent

#### *C or Cg horizon:*

Color—hue of 10YR, value of 4 or 5, and chroma of 1 to 4

Texture—loamy sand or loamy coarse sand that has strata of sandy loam

Content of rock fragments—0 to 14 percent

## Tiderishi Series

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Stratified loamy deposits overlying till

*Landform:* Flats and rises on lake plains and ground moraines and stream terraces

*Position on the landform:* Summits

*Slope range:* 0 to 2 percent

*Adjacent soils:* Alvada, Aurand, and Rensselaer

*Taxonomic class:* Fine-loamy, mixed, active, mesic Aquic Argiudolls

### Typical Pedon

Tiderishi loam, 0 to 2 percent slopes; in Hancock County, Ohio; about 4 miles west-southwest of Benton Ridge; Union Township; about 380 feet north and 2,280 feet east of the southwest corner of sec. 6, T. 1 S., R. 9 E.

Ap1—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; many fine and medium roots; 2 percent rock fragments; moderately acid; clear smooth boundary.

Ap2—9 to 11 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR

5/2) dry; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; common fine and medium roots; few medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; common fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; moderately acid; clear wavy boundary.

Bt1—11 to 18 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine and medium distinct dark grayish brown (10YR 4/2) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; moderately acid; gradual wavy boundary.

Bt2—18 to 28 inches; yellowish brown (10YR 5/4) clay loam that has thin strata of loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium and coarse distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common medium distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 2 percent rock fragments; slightly acid; gradual wavy boundary.

Bt3—28 to 36 inches; brown (10YR 5/3) loam; moderate fine and medium subangular blocky structure; friable; common fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; common medium and coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.

Bt4—36 to 42 inches; yellowish brown (10YR 5/4) loam that has thin strata of silty clay loam; weak medium subangular blocky structure; friable; few fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; neutral; clear wavy boundary.

Bt5—42 to 49 inches; brown (10YR 5/3) fine sandy loam that has strata of loamy fine sand; weak medium subangular blocky structure; very friable; few fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds and as bridging between sand grains; common medium faint dark grayish brown (10YR 4/2) iron depletions in the matrix; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine faint very dark grayish brown (10YR 3/2) moderately cemented iron and manganese oxide concretions in the matrix; neutral; abrupt wavy boundary.

BC—49 to 57 inches; yellowish brown (10YR 5/4) silt loam; weak medium platy structure; friable; few distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few medium distinct light gray (10YR

- 7/1) calcium carbonate concretions in the matrix; 2 percent rock fragments; strongly effervescent; slightly alkaline; clear wavy boundary.
- 2C—57 to 80 inches; dark yellowish brown (10YR 4/4) clay loam; massive with widely spaced vertical fractures; firm; few fine distinct grayish brown (10YR 5/2) iron depletions and few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation oriented along fractures; 4 percent rock fragments; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 15 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 35 to 60 inches

*Depth to till:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

*Ap and A horizons:*

Color—horizons have hue of 10YR or 2.5Y or are neutral in hue, have value of 2 or 3, and have chroma of 0 to 2

Texture—loam

Content of rock fragments—0 to 5 percent

*Bt or Btg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4

Texture—loam, clay loam, silty clay loam, silt loam, sandy clay loam, or fine sandy loam; horizon is commonly stratified

Content of rock fragments—0 to 10 percent

*BC or BCg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4

Texture—silt loam, loam, silty clay loam, or clay loam; thin strata of sandy material occur in some pedons

Content of rock fragments—0 to 10 percent

*2C or 2Cg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4

Texture—silt loam, clay loam, loam, or silty clay loam

Content of rock fragments—1 to 7 percent

## Westland Series

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Loamy deposits and the underlying sandy and gravelly outwash

*Landform:* Depressions and drainageways on outwash plains and glacial drainage channels

*Slope range:* 0 to 1 percent

*Adjacent soils:* Gallman, Rensselaer, Sleeth, and Thackery

*Taxonomic class:* Fine-loamy, mixed, superactive, mesic Typic Argiaquolls

### Typical Pedon

Westland clay loam, 0 to 1 percent slopes; in Allen County, Ohio; about 6 miles southeast of Lima; Perry Township; about 2,160 feet east and 60 feet south of the northwest corner of sec. 33, T. 4 S., R. 7 E.

Ap1—0 to 8 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; weak coarse subangular blocky structure parting to moderate fine

and very fine subangular blocky; friable; many fine and very fine roots; few faint very dark gray (10YR 3/1) organic coatings on faces of peds; 5 percent rock fragments; slightly acid; clear wavy boundary.

- Ap2—8 to 12 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; moderate medium and coarse angular blocky structure; friable; many fine and very fine roots; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; common fine distinct grayish brown (2.5Y 5/2) iron depletions on faces of peds; common fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) masses of iron accumulation on faces of peds; common fine faint black (10YR 2/1) manganese concretions in the matrix; 4 percent rock fragments; neutral; clear wavy boundary.
- Btg1—12 to 20 inches; dark gray (10YR 4/1) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common faint dark gray (10YR 4/1) clay films on faces of peds; few faint very dark gray (10YR 3/1) organic coatings on faces of peds; common fine distinct dark yellowish brown (10YR 4/4) and common fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few prominent strong brown (7.5YR 5/6) masses of iron accumulation on faces of peds; common fine faint black (10YR 2/1) manganese concretions in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.
- Btg2—20 to 25 inches; dark gray (10YR 4/1) clay loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; common fine faint grayish brown (2.5Y 5/2) iron depletions on faces of peds; common fine distinct yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/6) and brown (7.5YR 5/4) masses of iron accumulation in the matrix; common fine faint black (10YR 2/1) manganese concretions in the matrix; 2 percent rock fragments; neutral; clear smooth boundary.
- Btg3—25 to 32 inches; grayish brown (2.5Y 5/2) clay loam; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; few distinct dark gray (10YR 4/1) and common faint grayish brown (2.5Y 5/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common fine and medium prominent yellowish brown (10YR 5/6) and distinct yellowish brown (10YR 5/4) and common fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine prominent black (10YR 2/1) manganese concretions in the matrix; 4 percent rock fragments; neutral; clear smooth boundary.
- Btg4—32 to 39 inches; grayish brown (2.5Y 5/2) clay loam; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common medium distinct yellowish brown (10YR 5/4) and prominent brownish yellow (10YR 6/6) and common fine prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine prominent black (10YR 2/1) manganese concretions in the matrix; 4 percent rock fragments; neutral; clear wavy boundary.
- Btg5—39 to 47 inches; grayish brown (2.5Y 5/2) clay loam; weak fine and medium subangular blocky structure; friable; few fine and very fine roots; common faint grayish brown (2.5Y 5/2) clay films on horizontal faces of peds; common fine and medium prominent light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine prominent black (10YR 2/1) masses of manganese accumulation in the matrix; 5 percent rock fragments; neutral; clear wavy boundary.

BCg—47 to 54 inches; dark gray (N 4/0) loam that has thin strata of silty clay loam; weak coarse subangular blocky structure; very friable; common fine and medium prominent white (10YR 8/1) masses of calcium carbonate accumulation in the matrix; 5 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

2Cg1—54 to 66 inches; grayish brown (2.5Y 5/2) gravelly loamy coarse sand; single grain; loose; 25 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg2—66 to 80 inches; grayish brown (2.5Y 5/2) stratified gravelly loamy coarse sand and very gravelly loamy coarse sand; single grain; loose; 25 percent rock fragments in the gravelly loamy coarse sand and 40 percent rock fragments in the very gravelly loamy coarse sand; strongly effervescent; moderately alkaline.

#### **Range in Characteristics**

*Thickness of the mollic epipedon:* 10 to 20 inches

*Thickness of the solum:* 40 to 60 inches

*Depth to carbonates:* 40 to 60 inches

*Depth to bedrock:* More than 80 inches

#### *Ap horizon:*

Color—hue of 10YR or 2.5Y, value of 2, 2.5, or 3, and chroma of 1 to 3

Texture—loam or clay loam

Content of rock fragments—0 to 5 percent

#### *Btg horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2

Texture—loam, clay loam, or silty clay loam in the upper part and loam, clay loam, or sandy clay loam in the lower part

Content of rock fragments—0 to 5 percent in the upper part of horizon and 1 to 14 percent in the lower part

#### *BCg horizon:*

Color—horizon has hue of 10YR or 2.5Y or is neutral in hue, has value of 4 to 6, and has chroma of 0 to 2

Texture—loam, clay loam, sandy loam, or sandy clay loam or the gravelly or very gravelly analogues of those textures

Content of rock fragments—5 to 40 percent

#### *2Cg or 2C horizon:*

Color—hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 4

Texture—the gravelly or very gravelly analogues of loamy coarse sand or coarse sand; horizon is commonly stratified

Content of rock fragments—15 to 50 percent in individual strata; an average of 20 to 50 percent



# Formation of the Soils

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This section relates the factors of soil formation to the soils in Allen County. It also explains the processes of soil formation.

## Factors of Soil Formation

A soil is a three-dimensional natural body consisting of mineral and organic material that can support plant growth. The nature of any soil at a given site is the result of the interaction of five general factors—parent material, climate, plants and animals, relief, and time. Climate and plants and animals have an effect on parent material that is modified by relief over time. Theoretically, if all these factors were identical at different sites, the soils at these sites would be identical. Differences among the soils are caused by variations in one or more of the soil-forming factors.

## Parent Material

Parent material is the raw material acted upon by the other soil-forming factors. It largely determines the soil texture, which in turn affects other properties, such as natural soil drainage and permeability. The physical and chemical composition of parent material has an important effect on the kind of soil that forms.

Most of the parent material in Allen County was deposited by the last glacier that covered the survey area thousands of years ago or by meltwater from this glacier. Other parent material includes recent alluvium deposited by streams and organic deposits from decaying plants.

Most of the till in the county was deposited directly beneath ice with little action by water. The till contains particles ranging in size from clay to large stones. Most pebbles are angular, indicating little water action. Although most of the material in the till is of local origin, some igneous stones were carried from parts of Canada. The till at the surface was deposited during the Wisconsin glaciation.

The till plains in Allen County are either ground moraines or end moraines. Till plain deposits are massive and compact. These deposits are dominantly silty clay loam or clay loam. Variations in the content of clay and sand appear to be related to re-advances of the glacier into local lacustrine deposits. Blount, Glynwood, Lybrand, and Pewamo soils formed in till.

Some of the till in the county was subject to modification by water action during various stages of lake formation, during and after the Wisconsin glaciation. Water-modified till primarily occupies the surficial deposits in the northwestern part of the county. Hoytville and Nappanee soils formed in till that was leveled by wave action in shallow lake water.

Loamy glaciolacustrine or water-sorted materials were deposited by water or wave action along old lake shorelines or as longshore bars. The loamy Aurand, Cygnet, and Shawtown soils formed in beach deposits along old shorelines of glacial lake plains.

Meltwater deposits were laid down by water from the melting glacier. Gravel and sand were deposited in rapidly moving, sloping streams. Eldean, Fox, Gallman, Sleeth, Thackery, and Westland soils formed in loamy outwash and in the underlying sandy and/or gravelly outwash on stream terraces and in outwash areas. As the stream

gradient or the stream velocity lessened, the finer sand and silt particles were deposited as deltas and bars and in local lake basins. Alvada, Cygnet, and Rensselaer soils formed in loamy sediments. Where the streams flowed into local lakes, the finer particles settled out of the still water.

Clayey glaciolacustrine deposits are very limited in Allen County. They formed in a large basin known as Glacial Lake Maumee, which held meltwater from the retreating glacier and from precipitation. Shinrock soils formed in a thin layer of till overlying silty and clayey sediment in basins of former glacial lakes.

Millsdale and Milton soils formed in till or glaciofluvial deposits overlying dolostone or limestone. The limestone has a very high calcium carbonate equivalent, but it is not violently effervescent because of the dolomitic nature of the limestone.

Alluvium is the parent material of the soils on flood plains. It consists of material that accumulates when fresh sediments are added by stream overflow. The deposits vary widely, depending on the stream gradient and the source of the sediment. Alluvial sediment is stratified because deposition occurs in three basic stages. Gravel and stones are deposited on the streambed, sand is deposited on natural levees and as bars along the inner banks of meanders, and sand, silt, and clay are deposited during flooding. Flatrock, Knoxdale, Medway, Shoals, and Sloan soils formed in loamy alluvium. Harrod soils formed in loamy alluvium over limestone or dolostone. Saranac soils formed in clayey alluvium.

The upper part of Roundhead soils formed in decayed plant material that accumulated in marshes. The permanent wetness slowed decomposition and thus allowed the organic material to accumulate.

## Climate

The climate in Allen County is uniform enough that it has not greatly contributed to differences among the soils. It has favored physical change and chemical weathering of the parent material and the activity of living organisms.

Rainfall has been adequate to leach from the upper part of the subsoil any carbonates that were in the parent material of some of the soils on uplands and terraces. Wetting and drying cycles have resulted in the translocation of clay minerals and the formation of soil structure.

The range in temperature has favored both physical change and chemical weathering of the parent material. Freezing and thawing aided the formation of soil structure. Warm temperatures in summer favored chemical reactions in the weathering of the primary minerals. Rainfall amount and temperatures have been conducive to plant growth and the accumulation of organic matter in all of the soils.

## Plants and Animals

The vegetation under which a soil forms influences soil properties, such as soil color, structure, reaction, and content and distribution of organic matter. The surface layer of soils that formed under trees is generally lighter in color than that of soils that formed under grass because grasses generally return more organic matter to the soil. Grasses also provide shelter for many burrowing animals, which alter the structure and thickness of soil horizons. Earthworms, burrowing insects, and small animals are constantly mixing the soil, making it more porous and adding organic residue. Bacteria, fungi, and other micro-organisms contribute to the breakdown of organic residue. Generally, fungi are more active in acid soils and bacteria are more active in alkaline soils.

Two native plant communities made up most of the original vegetation of Allen County. The dominant type is the beech forest community. Beech, sugar maple, red oak, white ash, white oak, and basswood are the common species (11). This

community is associated with Blount, Glynwood, and Lybrand soils. The elm-ash swamp forest consists of American elm, black ash, red maple, pin oak, swamp white oak, and hickory. This community is associated with Hoytville, Patton, Pewamo, Rensselaer, Saranac, Sloan, and Westland soils and other very poorly drained soils (11).

Human activities also affect soil formation. These activities include cultivation, seeding, artificial drainage, irrigation, and cutting and filling. Accelerated erosion caused by clearing and cultivating the more sloping soils, such as Glynwood, Lybrand, and Shinrock soils, illustrates the impact of humans on soil formation. Loss of surface soil and compaction of the subsoil affect runoff and plant growth. Large areas of Hoytville and Pewamo soils have been systematically drained by ditches and subsurface drains. Draining reduces the content of organic matter and affects the processes of soil formation. Adding lime or fertilizer also affects the long-term development of the soil.

## Relief

Relief, along with parent material, affects the natural drainage of soils. It influences the amount of runoff and the depth to the water table. Generally, the steeper soils have better drainage than the nearly level soils. If natural drainage differs, different soils can form in the same parent material. For example, both Glynwood and Pewamo soils formed in till deposits. Glynwood soils are in high positions, and the water table generally is not as close to the surface. These soils are moderately well drained. Pewamo soils are in low, level areas, and the water table is near or above the surface. These soils are very poorly drained.

A drainage sequence, or catena, is a group of soils that formed in the same parent material but that differ in natural drainage. For example, the well drained Lybrand soils, the moderately well drained Glynwood soils, the somewhat poorly drained Blount soils, and the very poorly drained Pewamo soils make up a drainage sequence. All of these soils formed in silty clay loam and clay loam till.

## Time

The length of time the parent material has been exposed to the soil-forming processes influences the nature of the soil that forms. The youngest soils in Allen County, including Flatrock, Knoxdale, and Shoals soils, formed in recent stream deposits. Younger soils have horizons that are less well defined than those of the older soils.

The glacial deposits of Wisconsin age in Allen County are geologically young. Enough time, however, has elapsed for the active forces of climate and plants and animals to act on the parent material for the formation of soils with distinct soil horizons. In most of the soils, carbonates have been leached, structure has developed in the subsoil, and organic matter has accumulated in the surface layer.

## Processes of Soil Formation

Soil forms through complex, continuing processes. These processes are grouped into four general categories: additions, removals, transfers, and alterations.

The accumulation of organic matter in the formation of mineral soils is an example of an addition. The addition of organic residue has produced a dark surface layer. The upper part of the parent material originally was not darker than the lower part.

The loss of lime from the upper 2 to 4 feet of many of the soils in Allen County is an example of a removal. Although the parent material was limey (calcareous), water percolating through the soil has leached the lime from the upper part of the soil.

Water is the carrier for most of the transfers that have occurred in the soils of Allen County. Clay has been transferred from the A and E horizons to the B horizon in many of the soils. The A and E horizons (especially the E horizon) have become a zone of eluviation, and the B horizon has become a zone of illuviation. Clay films are in pores and on ped surfaces in the B horizon of some soils. The clay has been transferred from the A and E horizons. The presence or absence of clay films is an important criterion in soil classification.

The reduction and solution of ferrous iron is an example of an alteration. This process has taken place in the very poorly drained soils and, to a lesser extent, in the somewhat poorly drained and moderately well drained soils. The reduction of iron, or gleying, is prominent in the very poorly drained Alvada, Hoytville, and Pewamo soils. This process is the result of a recurring water table. A gray soil color indicates gleying. Reduced iron is soluble. The iron in the soils of Allen County, however, commonly has remained in the horizon where it originated or has settled in an underlying horizon. Iron can be reoxidized and segregated in places to form yellowish brown masses that are brighter than the surrounding soil. The alteration of iron causes mottling in soils that are not well drained.

To varying degrees, all of the soils in Allen County have been affected by each of the four soil-forming processes. The accumulation of organic matter has been prominent in the formation of Roundhead soils. The removal of carbonates and the transfer of clay have been important in the formation of Glynwood and Lybrand soils.

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# Glossary

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**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**Argillic horizon.** A subsoil horizon characterized by an accumulation of illuvial clay.

**Aspect.** The direction in which a slope faces.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....	0 to 3
Low .....	3 to 6
Moderate .....	6 to 9
High .....	9 to 12
Very high .....	more than 12

**Backslope.** The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

**Backswamp.** A flood plain landform. An extensive, marshy or swampy, depressed area of a flood plain between the natural levee and valley sides or terraces.

**Basal till.** Compact glacial till deposited beneath the ice.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope.** A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Beach ridge.** A low, essentially continuous mound of beach or beach and dune material heaped up by the action of waves and currents on the backshore of a beach, beyond the present limit of storm waves, and occurring singly or as one of a series of approximately parallel deposits. These ridges define the limits of relict lakes.

**Bedding planes.** Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

- Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- Bedrock-controlled topography.** A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.
- Beta horizon.** A special type of lower Bt horizon that has a significant accumulation of translocated silicate clay between two contrasting parent materials.
- Bottom land.** The normal flood plain of a stream, subject to flooding.
- Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.
- Bulk density.** The mass of a dry soil per unit bulk volume. The bulk volume is determined before drying to a constant weight at 105 degrees C. The value is expressed in grams per cubic centimeter.
- Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.
- California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.
- Canopy.** The leafy crown of trees or shrubs. (See Crown.)
- Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
- Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.
- Channery soil material.** Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.
- Chemical treatment.** Control of unwanted vegetation through the use of chemicals.
- Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clayey.** Containing more than 35 percent clay.
- Clay depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
- Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Coarse textured soil.** Sand or loamy sand.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**COLE (coefficient of linear extensibility).** See Linear extensibility.

**Compaction.** Any process by which the mineral grains of soil are rearranged to decrease void space and bring them into closer contact with one another, thereby increasing the weight of solid material per cubic foot. In agronomy, a term usually associated with machinery traffic across the soil during farming operations.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

**Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

**Contour.** An imaginary line on the surface of the earth connecting points of the same elevation.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Cropland.** Land used primarily for the production of adapted cultivated, close-growing crops, fruit, or nut crops for harvest, alone or in association with sod crops.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Crop residue management.** Returning crop residue to the soil, which helps to

maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Depth to bedrock** (in tables). Bedrock is too near the surface for the specified use.

**Depth to dense layer** (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Delta.** A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

**Dense material.** A very firm, massive, noncemented, root-restrictive layer (commonly till) that has no cracks or that has cracks that roots can enter spaced 10 centimeters or more apart. The materials within the survey area have a bulk density of more than 1.8 grams per cubic centimeter.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep soils, 20 to 40 inches; shallow soils, 10 to 20 inches; and very shallow soils, less than 10 inches.

**Dolostone.** A term used for the sedimentary rock dolomite in order to avoid confusion with the mineral of the same name. A carbonate sedimentary rock consisting mostly (more than 50 percent by weight) of the mineral dolomite  $[\text{CaMg}(\text{CO}_3)_2]$ .

**Drainage class** (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained*, *somewhat excessively drained*, *well drained*, *moderately well drained*, *somewhat poorly drained*, *poorly drained*, and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

**Drainageway.** A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have a small defined channel.

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Effervescence.** The gaseous response (observed as bubbles) of soil to applied hydrochloric acid (HCl) or other chemicals. Also, a field or laboratory test used to determine the presence of carbonates in the soil.

**End moraine.** A moraine produced at the front of an actively flowing glacier at any given time.

**Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

- Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
- Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
- Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
- Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Escarpment.** A relatively continuous and steep slope or cliff that is generally produced by erosion but can be produced by faulting breaking the continuity of more gently sloping land surfaces. Exposed non-bedrock material is non-soil or very shallow, poorly developed soil. Synonym: scarp.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
- Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Filtering capacity** (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
- Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
- Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.
- Footslope.** The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).
- Forb.** Any herbaceous plant not a grass or a sedge.
- Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.
- Frost action** (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
- Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
- Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

- Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.
- Glacial till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.
- Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.
- Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.
- Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.
- Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.
- Gravel.** Rounded or angular fragments of rock as much as 3 inches (7.6 centimeters) in diameter. An individual piece is a pebble.
- Gravelly soil material.** Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.
- Ground moraine.** An extensive, fairly even layer of till that has an uneven, undulating surface; a deposit of rock and mineral debris dragged along, in, on, and beneath a glacier and emplaced by processes including basal lodgement and release from downwasting stagnant ice by ablation.
- Ground water.** Water filling all the unblocked pores of the material below the water table.
- Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.
- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Hard to reclaim** (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.
- Head slope.** A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.
- Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.
- Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:
- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
- E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff potential.

The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Interfluve.** An elevated area between two drainageways that sheds water to those drainageways.

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Iron depletions.** Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lamella.** An illuvial horizon less than 7.5 centimeters thick. Lamellae contain an accumulation of oriented silicate clay on or bridging sand and silt grains (and rock fragments if present). A lamella has more silicate clay than the overlying eluvial horizon.

**Lake plain.** A nearly level surface marking the floor of an extinct lake filled in either by well sorted stratified sediments or by the reworking of existing sediments as a result of water action.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Limestone.** A sedimentary rock composed of calcium carbonate. There are many impure varieties.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Lithic contact.** A boundary between soil and continuous, coherent underlying material. The underlying material must be sufficiently coherent to make hand digging with a spade impractical.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine-grained material, dominantly of silt-sized particles, deposited by wind.

**Longshore bar.** A narrow, elongate, coarse textured ridge that once rose near to, or barely above, a pluvial or glacial lake and extended generally parallel to the shore but was separated from it by an intervening trough or lagoon; both the bar and lagoon are now relict features.

**Low strength.** The soil is not strong enough to support loads.

**Marl.** An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

**Marsh.** A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Marsh areas are dominantly covered by sedges, cattails, and rushes.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Miscellaneous water.** A small, manmade water area used for industrial, sanitary, or mining applications that contains water most of the year.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine.** An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties

of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size.

Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Muck.** Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**Mulch.** Any material, such as straw, sawdust, leaves, plastic film, or loose soil, that is spread upon the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, and evaporation.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nose slope.** A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

**No-till farming.** A method of planting crops that involves no seedbed preparation other than opening the soil for the purpose of placing the seed at the intended depth, which typically involves opening a small slit or punching a hole into the soil. There is usually no cultivation during crop production. Chemical weed control is normally used.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low .....	less than 0.5 percent
Low .....	0.5 to 1.0 percent
Moderately low .....	1.0 to 2.0 percent
Moderate .....	2.0 to 4.0 percent
High .....	4.0 to 8.0 percent
Very high .....	more than 8.0 percent

**Outwash plain.** A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

**Paralithic contact.** Similar to a lithic contact, except that the underlying material is softer and can be dug with difficulty with a spade.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Pebbles.** Rounded or partially rounded rock or mineral fragments that are between 2 and 75 millimeters in diameter.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Perennial water.** A small, natural or manmade lake, pond, or pit that contains water most of the year.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow .....	0.0 to 0.01 inch
Very slow .....	0.01 to 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 inch to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poorly graded.** Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5
Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3

Slightly alkaline .....	7.4 to 7.8
Moderately alkaline .....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Restricted permeability** (in tables). The slow movement of water through the soil adversely affects the specified use.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Rise.** A geomorphic component of flat plains (e.g., lake plain, low coastal plain, low-gradient till plain) consisting of a slightly elevated but low, broad area with low slope gradients (i.e., slopes of 1 to 3 percent). A rise is typically a microfeature but can be fairly extensive. Commonly, soils on a rise are better drained than those in the surrounding flat area.

**Riser.** The sloping surface of a series of natural step-like landforms, as those of successive stream terraces.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rock outcrop.** Exposures of base bedrock, usually hard rock, at the surface of the earth.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Sand.** As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water.

The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Short, steep slope.** A narrow soil area that has slopes that are at least 2 slope classes steeper than the slope class of the surrounding map unit.

**Shoulder.** The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Similar components.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level .....	0 to 1 percent
Nearly level .....	0 to 2 percent or 0 to 3 percent
Gently sloping .....	2 to 6 percent
Strongly sloping .....	6 to 12 percent
Moderately steep .....	12 to 20 percent
Steep .....	20 to 55 percent

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate

and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsidence.** The loss of volume that occurs in muck when it oxidizes or dries.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summit.** The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

**Swamp.** A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Swamps are dominantly covered by trees or shrubs.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil.

The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

**Thin layer** (in tables). Otherwise suitable soil material that is too thin for the specified use.

**Till plain.** An extensive area of nearly level to undulating soils underlain by glacial till.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope.** The position that forms the gently inclined surface at the base of a hillslope.

Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Tread.** The flat or gently sloping surface of natural steplike landforms, commonly one of a series, such as successive stream terraces.

**Typical pedon.** Site of the pedon described as typical for the series in the county.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Water table.** The upper surface of ground water, or the level below which the soil is saturated with water.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wet spot.** A somewhat poorly drained to very poorly drained area that is at least 2 drainage classes wetter than the named soils in the surrounding map unit.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The uprooting and tipping over of trees by the wind.

## Tables

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Table 1.--Temperature and Precipitation  
(Recorded in the period 1961-90 at Lima, Ohio)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Aver- age snow- fall
				Maximum temp. higher than--	Minimum temp. lower than--			Less than--	More than--		
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	32.8	17.0	24.9	60	-15	13	1.99	0.98	2.87	4	4.8
February--	36.8	19.5	28.2	63	-9	22	1.84	0.79	2.73	4	3.5
March----	48.4	29.5	39.0	77	4	122	3.02	1.82	4.10	7	2.1
April----	61.2	39.3	50.2	84	19	322	3.42	1.79	4.84	7	0.9
May-----	72.5	49.9	61.2	90	29	656	3.88	2.56	5.08	7	0.0
June-----	81.3	59.0	70.2	94	42	873	3.86	2.37	5.20	6	0.0
July-----	84.9	63.0	73.9	96	47	1,052	3.74	2.35	5.00	6	0.0
August---	82.7	61.1	71.9	95	44	988	3.11	1.63	4.40	5	0.0
September	76.6	54.7	65.6	92	34	742	3.26	1.75	4.59	5	0.0
October--	64.5	43.2	53.9	84	22	421	2.09	0.86	3.27	5	0.0
November-	50.9	34.2	42.5	74	14	154	3.08	1.65	4.33	7	3.7
December-	37.8	23.1	30.5	65	-5	35	2.69	1.50	3.74	6	4.2
Yearly:											
Average	60.9	41.1	51.0	---	---	---	---	---	---	---	---
Extreme	100	-21	---	97	-16	---	---	---	---	---	---
Total--	---	---	---	---	---	5,400	35.98	20.05	50.15	69	19.2

\* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.—Freeze Dates in Spring and Fall  
(Recorded in the period 1961-90 at Lima, Ohio)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 20	May 2	May 17
2 years in 10 later than--	Apr. 15	Apr. 27	May 11
5 years in 10 later than--	Apr. 5	Apr. 17	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 20	Oct. 8	Sept. 26
2 years in 10 earlier than--	Oct. 25	Oct. 13	Oct. 1
5 years in 10 earlier than--	Nov. 5	Oct. 23	Oct. 12

Table 3.—Growing Season  
(Recorded in the period 1961-90 at Lima, Ohio)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	176	163	140
8 years in 10	184	170	147
5 years in 10	199	183	161
2 years in 10	214	197	175
1 year in 10	222	204	182

Table 4.—Acreage and Proportionate Extent of the Map Units

Map symbol	Soil name	Acres	Percent
AkA	Alvada loam, 0 to 1 percent slopes-----	1,607	0.6
AmA	Alvada silty clay loam, 0 to 1 percent slopes-----	580	0.2
ArB	Arkport loamy fine sand, 2 to 6 percent slopes-----	199	*
AuA	Aurand loam, 0 to 3 percent slopes-----	577	0.2
AxA	Aurand silt loam, 0 to 3 percent slopes-----	170	*
BoA	Blount silt loam, 0 to 2 percent slopes-----	37,298	14.3
BoB	Blount silt loam, 2 to 4 percent slopes-----	66,895	25.7
BrA	Blount-Jenera complex, 0 to 3 percent slopes-----	738	0.3
BsA	Blount-Urban land complex, 0 to 2 percent slopes-----	2,213	0.9
CyA	Cygnat loam, 0 to 3 percent slopes-----	3,284	1.3
DaA	Darroch loam, 0 to 2 percent slopes-----	167	*
EmB	Eldean silt loam, 1 to 4 percent slopes-----	156	*
FdA	Flatrock silt loam, limestone substratum, 0 to 2 percent slopes, occasionally flooded-----	134	*
FnB	Fox loam, 2 to 6 percent slopes-----	221	*
FnD2	Fox loam, 12 to 18 percent slopes, eroded-----	7	*
FoA	Fox silt loam, 0 to 2 percent slopes-----	53	*
FpC2	Fox-Lybrand complex, 6 to 12 percent slopes, eroded-----	54	*
GaA	Gallman loam, 0 to 2 percent slopes-----	247	*
GaB	Gallman loam, 2 to 6 percent slopes-----	1,246	0.5
GaC	Gallman loam, 6 to 12 percent slopes-----	97	*
GbA	Gallman silt loam, 0 to 2 percent slopes-----	161	*
GkA	Glynwood loam, 0 to 2 percent slopes-----	229	*
GkB	Glynwood loam, 2 to 4 percent slopes-----	840	0.3
GmC2	Glynwood clay loam, 6 to 12 percent slopes, eroded-----	59	*
GnB	Glynwood silt loam, 2 to 6 percent slopes-----	12,182	4.7
GnC	Glynwood silt loam, 6 to 12 percent slopes-----	166	*
GrB2	Glynwood silty clay loam, 2 to 6 percent slopes, eroded-----	6,211	2.4
GrC2	Glynwood silty clay loam, 6 to 12 percent slopes, eroded-----	4,664	1.8
GuB	Glynwood-Urban land complex, 2 to 6 percent slopes-----	6,058	2.3
HgA	Harrod silt loam, 0 to 1 percent slopes, frequently flooded-----	283	0.1
HpA	Houcktown sandy loam, 0 to 2 percent slopes-----	67	*
HpB	Houcktown sandy loam, 2 to 4 percent slopes-----	461	0.2
HrA	Houcktown loam, 0 to 2 percent slopes-----	1,110	0.4
HrB	Houcktown loam, 2 to 6 percent slopes-----	2,954	1.1
HsA	Houcktown silt loam, 0 to 2 percent slopes-----	593	0.2
HsB	Houcktown silt loam, 2 to 4 percent slopes-----	394	0.2
HuC2	Houcktown-Glynwood complex, 6 to 12 percent slopes, eroded-----	127	*
HvA	Hoytville silty clay loam, 0 to 1 percent slopes-----	8,058	3.1
KnA	Knoxdale silt loam, 0 to 2 percent slopes, occasionally flooded-----	2,750	1.1
LbF	Lybrand silt loam, 20 to 55 percent slopes-----	627	0.2
LcD2	Lybrand silty clay loam, 12 to 20 percent slopes, eroded-----	800	0.3
MbA	Medway silt loam, 0 to 2 percent slopes, occasionally flooded-----	1,605	0.6
MmA	Millsdale silty clay loam, 0 to 1 percent slopes-----	146	*
MnA	Milton loam, 0 to 2 percent slopes-----	56	*
NpA	Nappanee clay loam, 0 to 2 percent slopes-----	746	0.3
PaA	Patton silty clay loam, loamy substratum, 0 to 1 percent slopes-----	170	*
PmA	Pewamo silty clay loam, 0 to 1 percent slopes-----	65,042	25.0
PoA	Pewamo-Urban land complex, 0 to 2 percent slopes-----	1,002	0.4
Pp	Pits, gravel-----	72	*
Ps	Pits, lime-----	23	*
Pt	Pits, quarry-----	347	0.1
RdA	Rensselaer loam, 0 to 1 percent slopes-----	456	0.2
ReA	Rensselaer loam, till substratum, 0 to 1 percent slopes-----	2,248	0.9
RgA	Rensselaer silt loam, 0 to 1 percent slopes-----	417	0.2
RoA	Roundhead muck, loamy substratum, 0 to 1 percent slopes-----	44	*
SbA	Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded-----	2,207	0.8
ScA	Saranac silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded-----	834	0.3
SdB	Seward loamy fine sand, deep phase, 0 to 5 percent slopes-----	170	*

See footnote at end of table.

Table 4.—Acreage and Proportionate Extent of the Map Units—Continued

Map symbol	Soil name	Acres	Percent
SfB	Shawtown loam, 2 to 6 percent slopes-----	2,428	0.9
SgC2	Shinrock clay loam, 6 to 12 percent slopes, eroded-----	70	*
ShA	Shoals silt loam, 0 to 1 percent slopes, occasionally flooded-----	749	0.3
SkA	Shoals silt loam, till substratum, 0 to 1 percent slopes, occasionally flooded-----	2,748	1.1
SnA	Sleeth silt loam, 0 to 2 percent slopes-----	278	0.1
SoA	Sloan silty clay loam, 0 to 1 percent slopes, occasionally flooded-----	9	*
SrA	Sloan silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded-----	4,409	1.7
ThB	Thackery sandy loam, sandy substratum, 1 to 3 percent slopes-----	198	*
TkA	Thackery loam, sandy substratum, 0 to 2 percent slopes-----	800	0.3
TnA	Tiderishi loam, 0 to 2 percent slopes-----	188	*
UdA	Udorthents, loamy, 0 to 2 percent slopes-----	690	0.3
UdD	Udorthents, loamy, 12 to 25 percent slopes-----	863	0.3
UrB	Urban land, undulating-----	2,151	0.8
W	Water-----	2,470	0.9
WdA	Westland clay loam, 0 to 1 percent slopes-----	1,384	0.5
WeA	Westland-Rensselaer complex, 0 to 1 percent slopes-----	583	0.2
	Total-----	260,340	100.0

\* Less than 0.1 percent.

Table 5.—Cropland Limitations and Hazards

(See text for a description of the limitations and hazards listed in this table. Only soils suitable for cultivated crops are listed)

Soil name and map symbol	Cropland limitations and hazards
AkA: Alvada-----	Ponding, frost action
AmA: Alvada-----	Ponding, surface compaction, frost action, fair tilth
ArB: Arkport-----	Moderate potential for ground-water pollution, erosion hazard, wind erosion, limited available water capacity
AuA: Aurand-----	Seasonal high water table, frost action
AxA: Aurand-----	Seasonal high water table, surface compaction, frost action
BoA: Blount-----	Seasonal high water table, surface compaction, frost action, surface crusting, high clay content
BoB: Blount-----	Seasonal high water table, surface compaction, frost action, surface crusting, erosion hazard, high clay content
BrA: Blount-----	Seasonal high water table, frost action, high clay content
Jenera-----	Seasonal high water table, frost action, wind erosion
CyA: Cygnet-----	Seasonal high water table, frost action
DaA: Darroch-----	Seasonal high water table, moderate potential for ground-water pollution, frost action
EmB: Eldean-----	Surface compaction, high potential for ground-water pollution, surface crusting, erosion hazard, limited available water capacity, high clay content
FdA: Flatrock-----	Occasional flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action, surface crusting
FnB: Fox-----	High potential for ground-water pollution, erosion hazard
FnD2: Fox-----	Part of the surface layer removed by erosion, high potential for ground-water pollution, fair tilth, easily eroded, erosion hazard, limited available water capacity
FoA: Fox-----	Surface compaction, high potential for ground-water pollution, surface crusting, high clay content

Table 5.—Cropland Limitations and Hazards—Continued

Soil name and map symbol	Cropland limitations and hazards
FpC2: Fox-----	Part of the surface layer removed by erosion, high potential for ground-water pollution, fair tilth, easily eroded, erosion hazard, limited available water capacity
Lybrand-----	Part of the surface layer removed by erosion, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, clodding, high clay content
GaA: Gallman-----	Moderate potential for ground-water pollution
GaB: Gallman-----	Moderate potential for ground-water pollution, erosion hazard
GaC: Gallman-----	Moderate potential for ground-water pollution, easily eroded, erosion hazard
GbA: Gallman-----	Surface compaction, moderate potential for ground-water pollution, surface crusting
GkA: Glynwood-----	Seasonal high water table, frost action, high clay content
GkB: Glynwood-----	Seasonal high water table, frost action, erosion hazard, high clay content
GmC2: Glynwood-----	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, frost action, fair tilth, easily eroded, erosion hazard, limited available water capacity, restricted permeability, clodding, high clay content
GnB: Glynwood-----	Seasonal high water table, surface compaction, frost action, surface crusting, erosion hazard, high clay content
GnC: Glynwood-----	Seasonal high water table, surface compaction, frost action, surface crusting, easily eroded, erosion hazard, high clay content
GrB2: Glynwood-----	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, frost action, fair tilth, surface crusting, erosion hazard, clodding, high clay content
GrC2: Glynwood-----	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, frost action, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, restricted permeability, clodding, high clay content
HgA: Harrod-----	Frequent flooding, seasonal high water table, surface compaction, depth to bedrock, high potential for ground-water pollution, frost action, limited available water capacity

Table 5.—Cropland Limitations and Hazards—Continued

Soil name and map symbol	Cropland limitations and hazards
HpA: Houcktown-----	Seasonal high water table, frost action, wind erosion, limited available water capacity
HpB: Houcktown-----	Seasonal high water table, frost action, erosion hazard, wind erosion, limited available water capacity
HrA: Houcktown-----	Seasonal high water table, frost action
HrB: Houcktown-----	Seasonal high water table, frost action, erosion hazard
HsA: Houcktown-----	Seasonal high water table, surface compaction, frost action, surface crusting
HsB: Houcktown-----	Seasonal high water table, surface compaction, frost action, surface crusting, erosion hazard, limited available water capacity
HuC2: Houcktown-----	Part of the surface layer removed by erosion, seasonal high water table, frost action, fair tilth, easily eroded, erosion hazard
Glynwood-----	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, frost action, fair tilth, easily eroded, erosion hazard, limited available water capacity, restricted permeability, clodding, high clay content
HvA: Hoytville-----	Ponding, surface compaction, frost action, fair tilth, clodding, high clay content
KnA: Knoxdale-----	Occasional flooding, surface compaction, frost action, surface crusting
LcD2: Lybrand-----	Part of the surface layer removed by erosion, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, clodding, high clay content
MbA: Medway-----	Occasional flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action
MmA: Millsdale-----	Ponding, surface compaction, depth to bedrock, high potential for ground-water pollution, frost action, fair tilth, limited available water capacity, high clay content
MnA: Milton-----	Depth to bedrock, high potential for ground-water pollution, limited available water capacity
NpA: Nappanee-----	Seasonal high water table, surface compaction, frost action, fair tilth, clodding, high clay content

Table 5.—Cropland Limitations and Hazards—Continued

Soil name and map symbol	Cropland limitations and hazards
PaA: Patton-----	Ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth
PmA: Pewamo-----	Ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth, clodding, high clay content
RdA, ReA: Rensselaer-----	Ponding, moderate potential for ground-water pollution, frost action
RgA: Rensselaer-----	Ponding, surface compaction, moderate potential for ground-water pollution, frost action
RoA: Roundhead-----	Ponding, moderate potential for ground-water pollution, frost action, subsidence of the muck, wind erosion, high clay content
SbA: Saranac-----	Ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth, high clay content
ScA: Saranac-----	Frequent flooding, ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth, high clay content
SdB: Seward-----	Erosion hazard, wind erosion
SfB: Shawtown-----	Erosion hazard
SgC2: Shinrock-----	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, frost action, fair tilth, easily eroded, erosion hazard, clodding, high clay content
ShA, SkA: Shoals-----	Occasional flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action, surface crusting
SnA: Sleeth-----	Seasonal high water table, surface compaction, high potential for ground-water pollution, frost action, surface crusting
SoA: Sloan-----	Occasional flooding, ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth
SrA: Sloan-----	Frequent flooding, ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth
ThB: Thackery-----	Seasonal high water table, high potential for ground-water pollution, frost action, wind erosion
TkA: Thackery-----	Seasonal high water table, high potential for ground-water pollution, frost action

Table 5.—Cropland Limitations and Hazards—Continued

Soil name and map symbol	Cropland limitations and hazards
TnA: Tiderishi-----	Seasonal high water table, frost action
WdA: Westland-----	Ponding, surface compaction, high potential for ground-water pollution, frost action, fair tilth
WeA: Westland-----	Ponding, high potential for ground-water pollution, frost action
Rensselaer-----	Ponding, moderate potential for ground-water pollution, frost action

Table 6.--Crop Yield Index

(This table is based on yields from the years 1992-2000.

Estimated yields for soils with a yield index of 100 are:  
corn--192 bushels; soybeans--60 bushels; and wheat--89  
bushels. Refer to the text for more information on how  
this table was developed and for instructions on converting  
yield index numbers to estimated yields. Absence of a  
yield index indicates that the map unit is not suited to  
the crop or the crop is generally not grown in areas of the  
map unit)

Map symbol and soil name	Corn	Soybeans	Winter wheat
AkA----- Alvada	87	93	84
AmA----- Alvada	85	88	81
ArB----- Arkport	68	58	74
AuA, AxA----- Aurand	87	83	87
BoA----- Blount	74	73	78
BoB----- Blount	71	67	74
BrA----- Blount-Jenera	75	77	79
CyA----- Cygnet	81	82	78
DaA----- Darroch	90	92	87
EmB----- Eldean	68	62	69
FdA----- Flatrock	74	77	70
FnB----- Fox	68	63	70
FoA----- Fox	71	67	74
FpC2----- Fox-Lybrand	58	53	54
GaA----- Gallman	73	67	73
GaB----- Gallman	71	63	70
GaC----- Gallman	62	58	56

Table 6.—Crop Yield Index—Continued

Map symbol and soil name	Corn	Soybeans	Winter wheat
GbA----- Gallman	73	67	73
GkA----- Glynwood	74	78	78
GkB----- Glynwood	68	63	70
GmC2----- Glynwood	58	53	54
GnB----- Glynwood	68	63	70
GnC----- Glynwood	62	58	56
GrB2----- Glynwood	61	58	56
GrC2----- Glynwood	58	53	54
HgA----- Harrod	64	73	---
HpA----- Houcktown	74	73	78
HpB----- Houcktown	69	63	70
HrA----- Houcktown	77	80	78
HrB----- Houcktown	74	73	78
HsA----- Houcktown	78	82	80
HsB----- Houcktown	75	75	76
HuC2----- Houcktown-Glynwood	62	57	71
HvA----- Hoytville	87	87	81
KnA----- Knoxdale	77	77	70
MbA----- Medway	77	82	71
MmA----- Millsdale	74	77	70

Table 6.—Crop Yield Index—Continued

Map symbol and soil name	Corn	Soybeans	Winter wheat
MnA----- Milton	61	58	57
NpA----- Nappanee	71	73	78
PaA----- Patton	94	92	88
PmA----- Pewamo	90	80	84
RdA, ReA, RgA----- Rensselaer	100	100	100
RoA----- Roundhead	78	83	---
SbA----- Saranac	71	67	60
ScA----- Saranac	71	67	---
SdB----- Seward	68	73	67
SfB----- Shawtown	74	68	70
SgC2----- Shinrock	61	53	58
ShA, SkA----- Shoals	74	73	70
SnA----- Sleeth	82	80	71
SoA----- Sloan	74	73	65
SrA----- Sloan	74	68	---
ThB----- Thackery	76	72	62
TkA----- Thackery	78	75	67
TnA----- Tiderishi	90	92	87
WdA----- Westland	96	92	93
WeA----- Westland-Rensselaer	98	93	96

Table 7.—Capability Class and Subclass

Capability class	Capability subclass	Acreage
Unclassified	---	15,889
1	---	6,689
2	e	88,146
	w	127,991
	s	109
3	e	6,725
	w	8,634
4	e	5,530
7	e	627

Table 8.—Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AkA	Alvada loam, 0 to 1 percent slopes (if drained)
AmA	Alvada silty clay loam, 0 to 1 percent slopes (if drained)
ArB	Arkport loamy fine sand, 2 to 6 percent slopes
AuA	Aurand loam, 0 to 3 percent slopes (if drained)
AxA	Aurand silt loam, 0 to 3 percent slopes (if drained)
BoA	Blount silt loam, 0 to 2 percent slopes (if drained)
BoB	Blount silt loam, 2 to 4 percent slopes (if drained)
BrA	Blount-Jenera complex, 0 to 3 percent slopes (if drained)
CyA	Cygnut loam, 0 to 3 percent slopes
DaA	Darroch loam, 0 to 2 percent slopes (if drained)
EmB	Eldean silt loam, 1 to 4 percent slopes
FdA	Flatrock silt loam, limestone substratum, 0 to 2 percent slopes, occasionally flooded
FnB	Fox loam, 2 to 6 percent slopes
FoA	Fox silt loam, 0 to 2 percent slopes
GaA	Gallman loam, 0 to 2 percent slopes
GaB	Gallman loam, 2 to 6 percent slopes
GbA	Gallman silt loam, 0 to 2 percent slopes
GkA	Glynwood loam, 0 to 2 percent slopes
GkB	Glynwood loam, 2 to 4 percent slopes
GnB	Glynwood silt loam, 2 to 6 percent slopes
GrB2	Glynwood silty clay loam, 2 to 6 percent slopes, eroded
HgA	Harrod silt loam, 0 to 1 percent slopes, frequently flooded (if protected from flooding or not frequently flooded during the growing season)
HpA	Houcktown sandy loam, 0 to 2 percent slopes
HpB	Houcktown sandy loam, 2 to 4 percent slopes
HrA	Houcktown loam, 0 to 2 percent slopes
HrB	Houcktown loam, 2 to 6 percent slopes
HsA	Houcktown silt loam, 0 to 2 percent slopes
HsB	Houcktown silt loam, 2 to 4 percent slopes
HvA	Hoytville silty clay loam, 0 to 1 percent slopes (if drained)
KnA	Knoxdale silt loam, 0 to 2 percent slopes, occasionally flooded
MbA	Medway silt loam, 0 to 2 percent slopes, occasionally flooded
MmA	Millsdale silty clay loam, 0 to 1 percent slopes (if drained)
MnA	Milton loam, 0 to 2 percent slopes
NpA	Nappanee clay loam, 0 to 2 percent slopes (if drained)
PaA	Patton silty clay loam, loamy substratum, 0 to 1 percent slopes (if drained)
PmA	Pewamo silty clay loam, 0 to 1 percent slopes (if drained)
RdA	Rensselaer loam, 0 to 1 percent slopes (if drained)
ReA	Rensselaer loam, till substratum, 0 to 1 percent slopes (if drained)
RgA	Rensselaer silt loam, 0 to 1 percent slopes (if drained)
RoA	Roundhead muck, loamy substratum, 0 to 1 percent slopes (if drained)
SbA	Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded (if drained)
ScA	Saranac silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded (if drained and either protected from flooding or not frequently flooded during the growing season)
SdB	Seward loamy fine sand, deep phase, 0 to 5 percent slopes
SfB	Shawtown loam, 2 to 6 percent slopes
ShA	Shoals silt loam, 0 to 1 percent slopes, occasionally flooded (if drained)
SkA	Shoals silt loam, till substratum, 0 to 1 percent slopes, occasionally flooded (if drained)
SnA	Sleeth silt loam, 0 to 2 percent slopes (if drained)
SoA	Sloan silty clay loam, 0 to 1 percent slopes, occasionally flooded (if drained)
SrA	Sloan silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded (if drained and either protected from flooding or not frequently flooded during the growing season)
ThB	Thackery sandy loam, sandy substratum, 1 to 3 percent slopes
TkA	Thackery loam, sandy substratum, 0 to 2 percent slopes
TnA	Tiderishi loam, 0 to 2 percent slopes (if drained)
WdA	Westland clay loam, 0 to 1 percent slopes (if drained)
WeA	Westland-Rensselaer complex, 0 to 1 percent slopes (if drained)

Table 9.—Hydric Soils

Map symbol	Soil name
AkA	Alvada loam, 0 to 1 percent slopes
AmA	Alvada silty clay loam, 0 to 1 percent slopes
HvA	Hoytville silty clay loam, 0 to 1 percent slopes
MmA	Millsdale silty clay loam, 0 to 1 percent slopes
PaA	Patton silty clay loam, loamy substratum, 0 to 1 percent slopes
PmA	Pewamo silty clay loam, 0 to 1 percent slopes
PoA	Pewamo-Urban land complex, 0 to 2 percent slopes
RdA	Rensselaer loam, 0 to 1 percent slopes
ReA	Rensselaer loam, till substratum, 0 to 1 percent slopes
RgA	Rensselaer silt loam, 0 to 1 percent slopes
RoA	Roundhead muck, loamy substratum, 0 to 1 percent slopes
SbA	Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded
ScA	Saranac silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded
SoA	Sloan silty clay loam, 0 to 1 percent slopes, occasionally flooded
SrA	Sloan silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded
WdA	Westland clay loam, 0 to 1 percent slopes
WeA	Westland-Rensselaer complex, 0 to 1 percent slopes

Table 10.—Nonhydryc Map Units With Hydryc Components

Map symbol and map unit name	Hydryc component	Landform
<b>AuA:</b> Aurand loam, 0 to 3 percent slopes-----	Hoytville soils at the margins of map units	Depressions and drainageways on lake plains
	Loamy, very poorly drained soils with till at a depth of 20 to 40 inches	Depressions on lake plains and ground moraines
	Alvada soils	Depressions on lake plains and ground moraines
<b>AxA:</b> Aurand silt loam, 0 to 3 percent slopes-----	Loamy, very poorly drained soils with till at a depth of 20 to 40 inches	Depressions on lake plains and ground moraines
	Alvada soils	Depressions on lake plains and ground moraines
<b>BoA:</b> Blount silt loam, 0 to 2 percent slopes-----	Pewamo soils	Depressions and drainageways on ground moraines and end moraines
<b>BoB:</b> Blount silt loam, 2 to 4 percent slopes-----	Pewamo soils	Drainageways on ground moraines and end moraines
<b>BrA:</b> Blount-Jenera complex, 0 to 3 percent slopes-----	Pewamo soils	Depressions and drainageways on ground moraines
<b>BsA:</b> Blount-Urban land complex, 0 to 2 percent slopes-----	Pewamo soils	Depressions and drainageways on ground moraines and end moraines
<b>CyA:</b> Cygnat loam, 0 to 3 percent slopes-----	Alvada soils in depressions and at the margins of map units	Depressions on lake plains

Table 10.—Nonhydryc Map Units With Hydryc Components—Continued

Map symbol and map unit name	Hydryc component	Landform
DaA: Darrock loam, 0 to 2 percent slopes-----	Rensselaer soils	Depressions and drainageways on lake plains
FdA: Flatrock silt loam, limestone substratum, 0 to 2 percent slopes, occasionally flooded-----	Sloan soils	Backswamps on flood plains
GkB: Glynwood loam, 2 to 4 percent slopes-----	Poorly drained and very poorly drained soils	Depressions and drainageways on ground moraines
HgA: Harrod silt loam, 0 to 1 percent slopes, frequently flooded-----	Very poorly drained soils with a thicker surface layer	Backswamps on flood plains
HpA: Houcktown sandy loam, 0 to 2 percent slopes-----	Alvada soils	Depressions on ground moraines and lake plains
HpB: Houcktown sandy loam, 2 to 4 percent slopes-----	Alvada soils	Depressions on ground moraines and lake plains
HrA: Houcktown loam, 0 to 2 percent slopes-----	Pewamo soils	Depressions on ground moraines
HsA: Houcktown silt loam, 0 to 2 percent slopes-----	Alvada soils	Depressions on ground moraines and lake plains
HuC2: Houcktown-Glynwood complex, 6 to 12 percent slopes, eroded-----	Very poorly drained soils	Drainageways on ground moraines
KnA: Knoxdale silt loam, 0 to 2 percent slopes, occasionally flooded-----	Saranac soils	Backswamps on flood plains

Table 10.—Nonhydryc Map Units With Hydryc Components—Continued

Map symbol and map unit name	Hydryc component	Landform
<b>MbA:</b> Medway silt loam, 0 to 2 percent slopes, occasionally flooded-----	Very poorly drained soils	Backswamps on flood plains
<b>MnA:</b> Milton loam, 0 to 2 percent slopes-----	Millsdale soils	Depressions on ground moraines
<b>NpA:</b> Nappanee clay loam, 0 to 2 percent slopes-----	Poorly drained soils	Lake plains
	Hoytville soils	Depressions and drainageways on lake plains
<b>RoA:</b> Roundhead muck, loamy substratum, 0 to 1 percent slopes-----	Patton soils	Depressions and drainageways on ground moraines
<b>ShA:</b> Shoals silt loam, 0 to 1 percent slopes, occasionally flooded-----	Saranac soils	Backswamps on flood plains
<b>SnA:</b> Sleeth silt loam, 0 to 2 percent slopes-----	Westland soils	Depressions and drainageways on outwash plains
<b>ThB:</b> Thackery sandy loam, sandy substratum, 1 to 3 percent slopes-----	Westland soils	Depressions on outwash plains
<b>TnA:</b> Tiderishi loam, 0 to 2 percent slopes-----	Rensselaer soils	Depressions and drainageways on lake plains
<b>UdA:</b> Udorthents, loamy, 0 to 2 percent slopes-----	Pewamo soils	Depressions and drainageways on ground moraines and end moraines
<b>UdD:</b> Udorthents, loamy, 12 to 25 percent slopes-----	Poorly drained soils at the centers of cloverleafs	Depressions on lake plains, end moraines, and ground moraines

Table 11.—Woodland Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Erosion hazard		Seedling mortality		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
ArB: Arkport-----	Slight Water erosion	0.06	Low		Moderate Low strength	0.50
AuA, AxA: Aurand-----	Slight Water erosion	0.02	High Wetness	1.00	Severe Low strength	1.00
BoA: Blount-----	Slight Water erosion	0.02	High Wetness	1.00	Severe Low strength	1.00
BoB: Blount-----	Slight Water erosion	0.07	High Wetness	1.00	Severe Low strength	1.00
BrA: Blount-----	Slight Water erosion	0.05	High Wetness	1.00	Severe Low strength	1.00
Jenera-----	Slight Water erosion	0.03	Low		Moderate Low strength	0.50
BsA: Blount-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
CyA: Cygnet-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
DaA: Darroch-----	Slight Water erosion	0.01	Low		Severe Low strength	1.00
EmB: Eldean-----	Slight Water erosion	0.07	Low		Severe Low strength	1.00
FdA: Flatrock-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
FnB: Fox-----	Slight Water erosion	0.10	Low		Severe Low strength	1.00

Table 11.—Woodland Management—Continued

Map symbol and soil name	Erosion hazard		Seedling mortality		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FnD2: Fox-----	Moderate Water erosion	0.37	Low		Severe Low strength	1.00
FoA: Fox-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
FpC2: Fox-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
Lybrand-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
GaA: Gallman-----	Slight Water erosion	0.01	Low		Severe Low strength	1.00
GaB: Gallman-----	Slight Water erosion	0.06	Low		Severe Low strength	1.00
GaC: Gallman-----	Slight Water erosion	0.14	Low		Severe Low strength	1.00
GbA: Gallman-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
GkA: Glynwood-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
GkB: Glynwood-----	Slight Water erosion	0.07	Low		Severe Low strength	1.00
GmC2: Glynwood-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
GnB: Glynwood-----	Slight Water erosion	0.10	Low		Severe Low strength	1.00
GnC: Glynwood-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
GrB2: Glynwood-----	Slight Water erosion	0.10	Low		Severe Low strength	1.00
GrC2: Glynwood-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00

Table 11.—Woodland Management—Continued

Map symbol and soil name	Erosion hazard		Seedling mortality		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GuB: Glynwood-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Slight Water erosion	0.01	Low		Severe Low strength	1.00
HpA: Houcktown-----	Slight Water erosion	0.01	Low		Moderate Low strength	0.50
HpB: Houcktown-----	Slight Water erosion	0.04	Low		Moderate Low strength	0.50
HrA: Houcktown-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
HrB: Houcktown-----	Slight Water erosion	0.10	Low		Severe Low strength	1.00
HsA: Houcktown-----	Slight Water erosion	0.01	Low		Severe Low strength	1.00
HsB: Houcktown-----	Slight Water erosion	0.04	Low		Severe Low strength	1.00
HuC2: Houcktown-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
Glynwood-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
HvA: Hoytville-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
KnA: Knoxdale-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
LbF: Lybrand-----	Severe Water erosion	0.93	Low		Severe Low strength	1.00
LcD2: Lybrand-----	Moderate Water erosion	0.39	Low		Severe Low strength	1.00
MbA: Medway-----	Slight Water erosion	0.01	Low		Severe Low strength	1.00

Table 11.—Woodland Management—Continued

Map symbol and soil name	Erosion hazard		Seedling mortality		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MmA: Millsdale-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
MnA: Milton-----	Slight Water erosion	0.01	Low		Severe Low strength	1.00
NpA: Nappanee-----	Slight Water erosion	0.02	High Wetness	1.00	Severe Low strength	1.00
PaA: Patton-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
PmA: Pewamo-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
PoA: Pewamo-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
RoA: Roundhead-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
SbA, ScA: Saranac-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
SdB: Seward-----	Slight Water erosion	0.04	Low		Moderate Low strength	0.50
SfB: Shawtown-----	Slight Water erosion	0.06	Low		Severe Low strength	1.00
SgC2: Shinrock-----	Slight Water erosion	0.22	Low		Severe Low strength	1.00
ShA, SkA: Shoals-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
SnA: Sleeth-----	Slight Water erosion	0.02	High Wetness	1.00	Severe Low strength	1.00

Table 11.—Woodland Management—Continued

Map symbol and soil name	Erosion hazard		Seedling mortality		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SoA, SrA: Sloan-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
ThB: Thackery-----	Slight Water erosion	0.03	Low		Moderate Low strength	0.50
TkA: Thackery-----	Slight Water erosion	0.02	Low		Severe Low strength	1.00
TnA: Tiderishi-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
WeA: Westland-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00
Rensselaer-----	Slight Water erosion	0.01	High Wetness	1.00	Severe Low strength	1.00

Table 12.—Woodland Harvesting Activities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
ArB: Arkport-----	Slight		Well suited		Well suited	
AuA, AxA: Aurand-----	Moderate Low strength	0.50	Moderately suited Depth to saturated zone Low strength	0.50 0.50	Moderately suited Low strength	0.50
BoA, BoB: Blount-----	Moderate Low strength	0.50	Poorly suited Depth to saturated zone Low strength	1.00 0.50	Moderately suited Low strength	0.50
BrA: Blount-----	Moderate Low strength	0.50	Poorly suited Depth to saturated zone Low strength	1.00 0.50	Moderately suited Low strength	0.50
Jenera-----	Slight		Moderately suited Depth to saturated zone	0.50	Well suited	
BsA: Blount-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
CyA: Cygnet-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
DaA: Darroch-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
EmB: Eldean-----	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50

Table 12.—Woodland Harvesting Activities—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FdA: Flatrock-----	Moderate Flooding Low strength	0.50 0.50	Moderately suited Flooding Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50
FnB: Fox-----	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50
FnD2: Fox-----	Moderate Slope Low strength Too sandy	0.50 0.50 0.50	Poorly suited Slope Low strength	1.00 0.50	Moderately suited Low strength	0.50
FoA: Fox-----	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50
FpC2: Fox-----	Moderate Low strength	0.50	Moderately suited Slope Low strength	0.50 0.50	Moderately suited Low strength	0.50
Lybrand-----	Moderate Low strength	0.50	Moderately suited Slope Low strength	0.50 0.50	Moderately suited Low strength	0.50
GaA, GaB: Gallman-----	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50
GaC: Gallman-----	Moderate Low strength	0.50	Moderately suited Slope Low strength	0.50 0.50	Moderately suited Low strength	0.50
GbA: Gallman-----	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50
GkA, GkB: Glynwood-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
GmC2: Glynwood-----	Moderate Low strength	0.50	Moderately suited Slope Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50

Table 12.—Woodland Harvesting Activities—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GnB: Glynwood-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
GnC: Glynwood-----	Moderate Low strength	0.50	Moderately suited Slope Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50
GrB2: Glynwood-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
GrC2: Glynwood-----	Moderate Low strength	0.50	Moderately suited Slope Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50
GuB: Glynwood-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Severe Flooding Low strength Depth to bedrock	1.00 0.50 0.50	Poorly suited Flooding Low strength Depth to saturated zone	1.00 0.50 0.50	Moderately suited Low strength	0.50
HpA, HpB: Houcktown-----	Slight		Moderately suited Depth to saturated zone	0.50	Well suited	
HrA, HrB, HsA, HsB: Houcktown-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
HuC2: Houcktown-----	Moderate Low strength	0.50	Moderately suited Slope Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50

Table 12.—Woodland Harvesting Activities—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HuC2: Glynwood-----	Moderate Low strength	0.50	Moderately suited Slope Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50
HvA: Hoytville-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
KnA: Knoxdale-----	Moderate Flooding Low strength	0.50 0.50	Moderately suited Flooding Low strength	0.50 0.50	Moderately suited Low strength	0.50
LbF: Lybrand-----	Severe Slope Low strength	1.00 0.50	Poorly suited Slope Low strength	1.00 0.50	Poorly suited Slope Low strength	1.00 0.50
LcD2: Lybrand-----	Moderate Slope Low strength	0.50 0.50	Poorly suited Slope Low strength	1.00 0.50	Moderately suited Low strength	0.50
MbA: Medway-----	Severe Flooding Low strength	1.00 0.50	Poorly suited Flooding Low strength Depth to saturated zone	1.00 0.50 0.50	Moderately suited Low strength	0.50
MmA: Millsdale-----	Moderate Low strength Depth to bedrock	0.50 0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
MnA: Milton-----	Moderate Low strength Depth to bedrock	0.50 0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50
NpA: Nappanee-----	Moderate Low strength	0.50	Poorly suited Depth to saturated zone Low strength	1.00 0.50	Moderately suited Low strength	0.50

Table 12.—Woodland Harvesting Activities—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PaA: Patton-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
PmA: Pewamo-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
PoA: Pewamo-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
RoA: Roundhead-----	Severe Low strength	1.00	Poorly suited Ponding Low strength Depth to saturated zone	1.00 1.00 1.00	Poorly suited Low strength	1.00
SbA: Saranac-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
ScA: Saranac-----	Severe Flooding Low strength	1.00 0.50	Poorly suited Ponding Flooding Depth to saturated zone Low strength	1.00 1.00 1.00 0.50	Moderately suited Low strength	0.50
SdB: Seward-----	Slight		Well suited		Well suited	
SfB: Shawtown-----	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Moderately suited Low strength	0.50

Table 12.—Woodland Harvesting Activities—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SgC2: Shinrock-----	Moderate Low strength	0.50	Moderately suited Slope Low strength Depth to saturated zone	0.50 0.50 0.50	Moderately suited Low strength	0.50
ShA, SkA: Shoals-----	Severe Flooding Low strength	1.00 0.50	Poorly suited Flooding Depth to saturated zone Low strength	1.00 0.50 0.50	Moderately suited Low strength	0.50
SnA: Sleeth-----	Moderate Low strength	0.50	Moderately suited Depth to saturated zone Low strength	0.50 0.50	Moderately suited Low strength	0.50
SoA, SrA: Sloan-----	Severe Flooding Low strength	1.00 0.50	Poorly suited Ponding Flooding Depth to saturated zone Low strength	1.00 1.00 1.00 0.50	Moderately suited Low strength	0.50
ThB: Thackery-----	Slight		Moderately suited Depth to saturated zone	0.50	Well suited	
TkA: Thackery-----	Moderate Low strength	0.50	Moderately suited Low strength Depth to saturated zone	0.50 0.50	Moderately suited Low strength	0.50
TnA: Tiderishi-----	Moderate Low strength	0.50	Moderately suited Depth to saturated zone Low strength	0.50 0.50	Moderately suited Low strength	0.50
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	

Table 12.—Woodland Harvesting Activities—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for roads (natural surface)		Harvest equipment operability	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WdA: Westland-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
WeA: Westland-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50
Rensselaer-----	Moderate Low strength	0.50	Poorly suited Ponding Depth to saturated zone Low strength	1.00 1.00 0.50	Moderately suited Low strength	0.50

Table 13.—Woodland Regeneration Activities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Suitability for mechanical planting		Suitability for site preparation		Potential for damage to soil by fire	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA: Alvada-----	Well suited		Well suited		Low Texture/rock fragments	0.01
AmA: Alvada-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.30
ArB: Arkport-----	Well suited		Well suited		High Texture/rock fragments	1.00
AuA, AxA: Aurand-----	Well suited		Well suited		Low Texture/rock fragments	0.01
BoA, BoB: Blount-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.01
BrA: Blount-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.01
Jenera-----	Well suited		Well suited		Low Texture/rock fragments	0.01
BsA: Blount-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
CyA: Cygnet-----	Well suited		Well suited		Low Texture/rock fragments	0.01
DaA: Darroch-----	Well suited		Well suited		Low Texture/rock fragments	0.01

Table 13.—Woodland Regeneration Activities—Continued

Map symbol and soil name	Suitability for mechanical planting		Suitability for site preparation		Potential for damage to soil by fire	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
EmB: Eldean-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.01
FdA: Flatrock-----	Well suited		Well suited		Low Texture/rock fragments	0.01
FnB: Fox-----	Well suited		Well suited		Low Texture/rock fragments	0.01
FnD2: Fox-----	Poorly suited Slope	0.75	Poorly suited Slope	0.75	Moderate Texture/rock fragments	0.50
FoA: Fox-----	Moderately suited Rock fragment content	0.50	Well suited		Low Texture/rock fragments	0.01
FpC2: Fox-----	Moderately suited Slope	0.50	Well suited		Moderate Texture/surface depth/rock fragments	0.50
Lybrand-----	Moderately suited Stickiness Slope	0.50 0.50	Well suited		Moderate Texture/rock fragments	0.70
GaA, GaB: Gallman-----	Well suited		Well suited		Low Texture/rock fragments	0.01
GaC: Gallman-----	Moderately suited Slope	0.50	Well suited		Low Texture/rock fragments	0.01
GbA: Gallman-----	Well suited		Well suited		Low Texture/rock fragments	0.01
GkA, GkB: Glynwood-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.01
GmC2: Glynwood-----	Moderately suited Stickiness Slope	0.50 0.50	Well suited		Moderate Texture/rock fragments	0.50

Table 13.—Woodland Regeneration Activities—Continued

Map symbol and soil name	Suitability for mechanical planting		Suitability for site preparation		Potential for damage to soil by fire	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GnB: Glynwood-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.01
GnC: Glynwood-----	Moderately suited Stickiness Slope	0.50 0.50	Well suited		Low Texture/rock fragments	0.01
GrB2: Glynwood-----	Moderately suited Stickiness	0.50	Well suited		Moderate Texture/rock fragments	0.70
GrC2: Glynwood-----	Moderately suited Stickiness Slope	0.50 0.50	Well suited		Moderate Texture/rock fragments	0.70
GuB: Glynwood-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Well suited		Well suited		Low Texture/rock fragments	0.01
HpA, HpB: Houcktown-----	Well suited		Well suited		Moderate Texture/rock fragments	0.50
HrA, HrB, HsA, HsB: Houcktown-----	Well suited		Well suited		Low Texture/rock fragments	0.01
HuC2: Houcktown-----	Moderately suited Slope	0.50	Well suited		Moderate Texture/rock fragments	0.50
Glynwood-----	Moderately suited Stickiness Slope	0.50 0.50	Well suited		Moderate Texture/rock fragments	0.50
HvA: Hoytville-----	Poorly suited Stickiness	0.75	Poorly suited Stickiness	0.75	Low Texture/rock fragments	0.30
KnA: Knoxdale-----	Well suited		Well suited		Low Texture/rock fragments	0.01

Table 13.—Woodland Regeneration Activities—Continued

Map symbol and soil name	Suitability for mechanical planting		Suitability for site preparation		Potential for damage to soil by fire	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LbF: Lybrand-----	Unsuited Slope Stickiness	1.00 0.50	Unsuited Slope	1.00	Low Texture/rock fragments	0.01
LcD2: Lybrand-----	Poorly suited Slope Stickiness	0.75 0.50	Poorly suited Slope	0.75	High Texture/surface depth/rock fragments	1.00
MbA: Medway-----	Well suited		Well suited		Low Texture/rock fragments	0.01
MmA: Millsdale-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.30
MnA: Milton-----	Well suited		Well suited		Low Texture/rock fragments	0.01
NpA: Nappanee-----	Poorly suited Stickiness	0.75	Poorly suited Stickiness	0.75	Low Texture/rock fragments	0.01
PaA: Patton-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.30
PmA: Pewamo-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.30
PoA: Pewamo-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Well suited		Well suited		Low Texture/rock fragments	0.01
RoA: Roundhead-----	Moderately suited Stickiness	0.50	Well suited		Low	

Table 13.—Woodland Regeneration Activities—Continued

Map symbol and soil name	Suitability for mechanical planting		Suitability for site preparation		Potential for damage to soil by fire	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SbA, ScA: Saranac-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.30
SdB: Seward-----	Well suited		Well suited		Moderate Texture/rock fragments	0.50
SfB: Shawtown-----	Well suited		Well suited		Low Texture/rock fragments	0.01
SgC2: Shinrock-----	Moderately suited Stickiness Slope	0.50 0.50	Well suited		Moderate Texture/surface depth/rock fragments	0.50
ShA, SkA: Shoals-----	Well suited		Well suited		Low Texture/rock fragments	0.01
SnA: Sleeth-----	Well suited		Well suited		Low Texture/rock fragments	0.01
SoA, SrA: Sloan-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.30
ThB: Thackery-----	Well suited		Well suited		Moderate Texture/rock fragments	0.50
TkA: Thackery-----	Well suited		Well suited		Low Texture/rock fragments	0.01
TnA: Tiderishi-----	Well suited		Well suited		Low Texture/rock fragments	0.01
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	

Table 13.—Woodland Regeneration Activities—Continued

Map symbol and soil name	Suitability for mechanical planting		Suitability for site preparation		Potential for damage to soil by fire	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WdA: Westland-----	Moderately suited Stickiness	0.50	Well suited		Low Texture/rock fragments	0.01
WeA: Westland-----	Well suited		Well suited		Low Texture/rock fragments	0.01
Rensselaer-----	Well suited		Well suited		Low Texture/rock fragments	0.01

Table 14.--Woodland Productivity

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber  cu ft/ac	
<b>AkA, AmA:</b>				
Alvada-----	eastern cottonwood--	---	0	American sycamore,
	green ash-----	---	0	Norway spruce,
	pin oak-----	86	72	eastern
	red maple-----	---	0	cottonwood, green
	swamp white oak----	85	72	ash, pin oak, red
				maple, silver
				maple, swamp white
				oak, sweetgum,
				white ash
<b>ArB:</b>				
Arkport-----	eastern white pine--	85	143	Norway spruce,
	red pine-----	85	172	black cherry,
	sugar maple-----	70	43	black walnut,
				eastern white
				pine, northern red
				oak, sugar maple,
				tuliptree, white
				ash
<b>AuA, AxA:</b>				
Aurand-----	northern red oak----	80	57	American sycamore,
	white oak-----	75	57	Norway spruce,
				black cherry,
				black oak, eastern
				cottonwood,
				eastern redcedar,
				green ash,
				northern red oak,
				pin oak, red
				maple, silver
				maple, swamp white
				oak, tuliptree,
				white ash, white
				oak
<b>BoA, BoB:</b>				
Blount-----	bur oak-----	---	0	American sycamore,
	northern red oak----	65	43	black oak, eastern
	pin oak-----	---	0	cottonwood,
	sugar maple-----	---	---	eastern redcedar,
	white ash-----	---	---	green ash,
	white oak-----	65	43	northern red oak,
				pin oak, red
				maple, silver
				maple, swamp white
				oak

Table 14.--Woodland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
BrA:				
Blount-----	bur oak-----	---	0	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak
	northern red oak----	65	43	
	pin oak-----	---	0	
	sugar maple-----	---	---	
	white ash-----	---	---	
	white oak-----	65	43	
Jenera-----	black cherry-----	---	0	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak
	eastern cottonwood--	---	0	
	green ash-----	---	0	
	pin oak-----	86	72	
	red maple-----	---	0	
	swamp white oak----	---	0	
BsA:				
Blount-----	bur oak-----	---	0	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak
	northern red oak----	65	43	
	pin oak-----	---	0	
	sugar maple-----	---	---	
	white ash-----	---	---	
	white oak-----	65	43	
Urban land.				
CyA:				
Cygnet-----	black cherry-----	---	0	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak
	black walnut-----	---	0	
	northern red oak----	90	72	
	sugar maple-----	---	0	
	tuliptree-----	---	0	
	white ash-----	---	0	
	white oak-----	90	72	
DaA:				
Darroch-----	American basswood---	---	0	American sycamore, Norway spruce, black cherry, eastern cottonwood, eastern redcedar, green ash, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak
	northern red oak----	66	57	
	quaking aspen-----	---	0	
	red maple-----	---	0	
	white ash-----	---	0	

Table 14.--Woodland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
<b>EmB:</b>				
Eldean-----	black cherry-----	---	0	black locust,
	northern red oak----	80	57	eastern white
	sugar maple-----	---	0	pine, red pine,
	white ash-----	---	0	tuliptree, white
	white oak-----	---	0	ash
<b>FdA:</b>				
Flatrock-----	black cherry-----	---	0	Norway spruce,
	black walnut-----	---	0	black cherry,
	northern red oak----	80	57	black walnut,
	tuliptree-----	---	0	eastern white
	white oak-----	---	0	pine, green ash,
				northern red oak,
				pin oak,
				tuliptree, white
				ash, white oak
<b>FnB, FnD2, FoA:</b>				
Fox-----	black cherry-----	---	0	black locust,
	northern red oak----	80	57	eastern white
	sugar maple-----	---	0	pine, red pine,
	white ash-----	---	0	tuliptree, white
	white oak-----	---	0	ash
<b>FpC2:</b>				
Fox-----	black cherry-----	---	0	black locust,
	northern red oak----	80	57	eastern white
	sugar maple-----	---	0	pine, red pine,
	white ash-----	---	0	tuliptree, white
	white oak-----	---	0	ash
<b>Lybrand-----</b>	black walnut-----	---	0	Norway spruce,
	bur oak-----	---	0	black cherry,
	northern red oak----	80	57	black walnut,
	shagbark hickory----	---	0	eastern white
	tuliptree-----	90	86	pine, green ash,
	white oak-----	80	57	northern red oak,
				tuliptree, white
				oak
<b>GaA, GaB, GaC, GbA:</b>				
Gallman-----	black cherry-----	---	0	black cherry, black
	black walnut-----	---	0	walnut, eastern
	northern red oak----	90	72	white pine,
	sugar maple-----	---	0	northern red oak,
	tuliptree-----	---	0	sugar maple,
	white ash-----	---	0	tuliptree, white
	white oak-----	85	72	ash, white oak
<b>GkA, GkB, GmC2, GnB, GnC, GrB2, GrC2:</b>				
Glynwood-----	black cherry-----	---	0	Austrian pine,
	black oak-----	80	57	black oak, green
	northern red oak----	80	57	ash, pin oak, red
	red maple-----	---	0	maple, tuliptree,
	slippery elm-----	---	0	white ash, white
	white ash-----	---	0	oak
	white oak-----	80	57	

Table 14.--Woodland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
GuB:				
Glynwood-----	black cherry-----	---	0	Austrian pine,
	black oak-----	80	57	black oak, green
	northern red oak----	80	57	ash, pin oak, red
	red maple-----	---	0	maple, tuliptree,
	slippery elm-----	---	0	white ash, white
	white ash-----	---	0	oak
	white oak-----	80	57	
Urban land.				
HgA:				
Harrod-----	green ash-----	---	---	Norway spruce,
	pin oak-----	85	5	black oak, green
	red maple-----	---	---	ash, northern red
	swamp white oak----	---	---	oak, pin oak,
				tuliptree, white
				ash, white oak
HpA, HpB, HrA, HrB, HsA, HsB:				
Houcktown-----	black cherry-----	---	0	Norway spruce,
	northern red oak----	80	57	black cherry,
	pin oak-----	90	72	black walnut,
	sugar maple-----	---	0	eastern white
	tuliptree-----	---	0	pine, green ash,
	white ash-----	---	0	northern red oak,
	white oak-----	75	57	pin oak,
				tuliptree, white
				ash, white oak
HuC2:				
Houcktown-----	black cherry-----	---	0	Norway spruce,
	northern red oak----	80	57	black cherry,
	pin oak-----	90	72	black walnut,
	sugar maple-----	---	0	eastern white
	tuliptree-----	---	0	pine, green ash,
	white ash-----	---	0	northern red oak,
	white oak-----	75	57	pin oak,
				tuliptree, white
				ash, white oak
Glynwood-----	black cherry-----	---	0	Austrian pine,
	black oak-----	80	57	black oak, green
	northern red oak----	80	57	ash, pin oak, red
	red maple-----	---	0	maple, tuliptree,
	slippery elm-----	---	0	white ash, white
	white ash-----	---	0	oak
	white oak-----	80	57	
HvA:				
Hoytville-----	black cherry-----	---	0	American sycamore,
	eastern cottonwood--	---	0	Norway spruce,
	green ash-----	---	0	eastern
	northern red oak----	72	57	cottonwood, green
	pin oak-----	76	57	ash, pin oak, red
	red maple-----	---	0	maple, silver
	white ash-----	77	43	maple, swamp white
				oak, sweetgum,
				white ash

Table 14.--Woodland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
<b>KnA:</b>				
<b>Knoxdale</b> -----	black cherry-----	---	0	black cherry, black
	black walnut-----	---	0	walnut, eastern
	tuliptree-----	100	114	white pine,
	white ash-----	---	0	northern red oak,
	white oak-----	90	72	sugar maple,
				tuliptree, white
				ash, white oak
<b>LbF, LcD2:</b>				
<b>Lybrand</b> -----	black walnut-----	---	0	Norway spruce,
	bur oak-----	---	0	black cherry,
	northern red oak----	80	57	black walnut,
	shagbark hickory----	---	0	eastern white
	tuliptree-----	90	86	pine, green ash,
	white oak-----	80	57	northern red oak,
				tuliptree, white
				oak
<b>MbA:</b>				
<b>Medway</b> -----	black cherry-----	---	0	Norway spruce,
	black walnut-----	---	0	black cherry,
	northern red oak----	86	72	black walnut,
	sugar maple-----	---	0	eastern white
	tuliptree-----	96	100	pine, green ash,
	white ash-----	---	0	northern red oak,
	white oak-----	---	0	pin oak,
				tuliptree, white
				ash, white oak
<b>MmA:</b>				
<b>Millsdale</b> -----	black cherry-----	---	0	American sycamore,
	eastern cottonwood--	---	0	Norway spruce,
	green ash-----	---	0	eastern
	pin oak-----	86	72	cottonwood, green
	red maple-----	---	0	ash, pin oak, red
	swamp white oak----	---	0	maple, silver
				maple, swamp white
				oak, sweetgum,
				white ash
<b>MnA:</b>				
<b>Milton</b> -----	black cherry-----	---	0	American basswood,
	black walnut-----	---	0	black walnut,
	northern red oak----	80	57	eastern redcedar,
	sugar maple-----	---	0	eastern white
	tuliptree-----	95	100	pine, northern red
	white ash-----	---	0	oak, white ash,
	white oak-----	---	0	white oak

Table 14.—Woodland Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
NpA: Nappanee-----	American sycamore---	---	0	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak
	pin oak-----	85	72	
	sweetgum-----	80	86	
	white oak-----	75	72	
PaA: Patton-----	northern red oak----	75	57	Norway spruce, eastern white pine, red maple, white ash
	pin oak-----	85	72	
	white oak-----	75	57	
PmA: Pewamo-----	eastern cottonwood--	98	129	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	green ash-----	---	0	
	pin oak-----	90	72	
	red maple-----	71	43	
	swamp white oak----	---	0	
	white ash-----	71	72	
PoA: Pewamo-----	eastern cottonwood--	98	129	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	green ash-----	---	0	
	pin oak-----	90	72	
	red maple-----	71	43	
	swamp white oak----	---	0	
	white ash-----	71	72	
Urban land.				
Pp, Ps, Pt. Pits				
RdA, ReA, RgA: Rensselaer-----	northern red oak----	76	57	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	pin oak-----	86	72	
	sweetgum-----	90	100	
	white oak-----	75	57	

Table 14.--Woodland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
<b>RoA:</b>				
Roundhead-----	northern red oak----	76	57	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	pin oak-----	86	72	
	sweetgum-----	90	100	
	white oak-----	75	57	
<b>SbA, ScA:</b>				
Saranac-----	eastern cottonwood--	---	0	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	green ash-----	---	0	
	pin oak-----	86	72	
	red maple-----	---	0	
	swamp white oak----	---	0	
<b>SdB:</b>				
Seward-----	black cherry-----	---	0	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak
	black walnut-----	---	0	
	northern red oak----	90	72	
	sugar maple-----	---	0	
	tuliptree-----	---	0	
	white ash-----	---	0	
	white oak-----	90	72	
<b>SfB:</b>				
Shawtown-----	American basswood---	66	57	black cherry, black walnut, eastern white pine, northern red oak, sugar maple, tuliptree, white ash, white oak
	eastern white pine--	85	200	
	white oak-----	70	57	
<b>SgC2:</b>				
Shinrock-----	black cherry-----	---	0	Austrian pine, black oak, green ash, pin oak, red maple, tuliptree, white ash, white oak
	northern red oak----	80	57	
	red maple-----	---	0	
	slippery elm-----	---	0	
	white ash-----	---	0	
	white oak-----	---	0	
<b>ShA, SkA:</b>				
Shoals-----	Virginia pine-----	90	129	American sycamore, eastern cottonwood, pin oak, red maple, swamp white oak, sweetgum, tuliptree
	eastern cottonwood--	---	0	
	pin oak-----	90	72	
	sweetgum-----	86	100	
	tuliptree-----	90	86	
	white ash-----	---	0	

Table 14.--Woodland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber  cu ft/ac	
SnA: Sleeth-----	black oak----- bur oak----- green ash----- northern red oak---- quaking aspen----- red maple----- slippery elm-----	--- --- --- 80 --- --- ---	0 0 0 57 0 0 0	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak
SoA, SrA: Sloan-----	eastern cottonwood-- green ash----- pin oak----- red maple----- swamp white oak----	--- --- 86 --- ---	0 0 72 0 0	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
ThB, TkA: Thackery-----	black cherry----- black walnut----- northern red oak---- sugar maple----- tuliptree----- white ash----- white oak-----	--- --- 90 --- --- --- 90	0 0 72 0 0 0 72	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak
TnA: Tiderishi-----	American basswood--- northern red oak---- quaking aspen----- red maple----- white ash-----	--- 66 --- --- ---	0 57 0 0 0	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak
UdA, UdD. Udorthents				
UrB. Urban land				

Table 14.—Woodland Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
W. Water				
WdA:				
Westland-----	pin oak-----	85	72	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	sweetgum-----	90	100	
	white oak-----	75	57	
WeA:				
Westland-----	pin oak-----	85	72	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	sweetgum-----	90	100	
	white oak-----	75	57	
Rensselaer-----	northern red oak----	76	57	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash
	pin oak-----	86	72	
	sweetgum-----	90	100	
	white oak-----	75	57	

Table 15.—Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AkA, AmA: Alvada-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
ArB: Arkport-----	redbud	American cranberrybush, Washington hawthorn	Austrian pine, osageorange	arborvitae, Norway spruce, eastern white pine	northern red oak
AuA, AxA: Aurand-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	baldcypress, eastern redcedar, arborvitae, Austrian pine	pin oak, Norway spruce	green ash
BoA, BoB: Blount-----	silky dogwood, southern arrowwood	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar	green ash, osageorange, Austrian pine, Norway spruce, arborvitae	Shumard's oak, pin oak	swamp white oak
BrA: Blount-----	silky dogwood, southern arrowwood	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar	green ash, osageorange, Austrian pine, Norway spruce, arborvitae	Shumard's oak, pin oak	swamp white oak
Jenera-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	white fir, arborvitae, baldcypress, blue spruce, eastern redcedar	Austrian pine, Norway spruce, green ash, pin oak	eastern white pine

Table 15.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BsA: Blount-----	silky dogwood, southern arrowwood	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar	green ash, osageorange, Austrian pine, Norway spruce, arborvitae	Shumard's oak, pin oak	swamp white oak
Urban land.					
CyA: Cygnet-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	white fir, arborvitae, baldcypress, blue spruce, eastern redcedar	Austrian pine, Norway spruce, green ash, pin oak	eastern white pine
DaA: Darroch-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	baldcypress, eastern redcedar, arborvitae, Austrian pine	pin oak, Norway spruce	green ash
EmB: Eldean-----	Siberian peashrub, common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	Austrian pine, jack pine, red pine, eastern white pine	---	---
FdA: Flatrock-----	silky dogwood	American cranberrybush, blackhaw, European alder, Washington hawthorn, eastern redcedar, southern arrowwood	osageorange, arborvitae, blue spruce	Austrian pine, Norway spruce	pin oak, eastern white pine
FnB, FnD2, FoA: Fox-----	Siberian peashrub, common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	Austrian pine, jack pine, red pine, eastern white pine	---	---

Table 15.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
FpC2: Fox-----	Siberian peashrub, common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	Austrian pine, jack pine, red pine, eastern white pine	---	---
Lybrand-----	American cranberrybush	Washington hawthorn, eastern redcedar, southern arrowwood	osageorange, Austrian pine	green ash, eastern white pine	northern red oak
GaA, GaB, GaC, GbA: Gallman-----	Japanese tree lilac, Siberian peashrub, redbud	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar	Austrian pine, osageorange, blue spruce, eastern white pine, Norway spruce, arborvitae	white oak, white spruce	northern red oak, white ash, eastern white pine
GkA, GkB, GmC2, GnB, GnC, GrB2, GrC2: Glynwood-----	American cranberrybush, blackhaw	southern arrowwood, Washington hawthorn, eastern redcedar	baldcypress, osageorange, Austrian pine, arborvitae	Norway spruce, green ash, black oak, pin oak	northern red oak
GuB: Glynwood-----	American cranberrybush, blackhaw	southern arrowwood, Washington hawthorn, eastern redcedar	baldcypress, osageorange, Austrian pine, arborvitae	Norway spruce, green ash, black oak, pin oak	northern red oak
Urban land.					
HgA: Harrod-----	American cranberrybush, redbud	southern arrowwood, Washington hawthorn	Austrian pine, arborvitae, Norway spruce	eastern white pine, green ash, pin oak	northern red oak
HpA, HpB, HrA, HrB, HsA, HsB: Houcktown-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	white fir, arborvitae, baldcypress, blue spruce, eastern redcedar	Austrian pine, Norway spruce, green ash, pin oak	eastern white pine

Table 15.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HuC2: Houcktown-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	white fir, arborvitae, baldcypress, blue spruce, eastern redcedar	Austrian pine, Norway spruce, green ash, pin oak	eastern white pine
Glynwood-----	American cranberrybush, blackhaw	southern arrowwood, Washington hawthorn, eastern redcedar	baldcypress, osageorange, Austrian pine, arborvitae	Norway spruce, green ash, black oak, pin oak	northern red oak
HvA: Hoytville-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
KnA: Knoxdale-----	Japanese tree lilac, Siberian peashrub, redbud	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar	Austrian pine, osageorange, blue spruce, eastern white pine, Norway spruce, arborvitae	white oak, white spruce	northern red oak, white ash, eastern white pine
LbF, LcD2: Lybrand-----	American cranberrybush	Washington hawthorn, eastern redcedar, southern arrowwood	osageorange, Austrian pine	green ash, eastern white pine	northern red oak
MbA: Medway-----	silky dogwood	American cranberrybush, blackhaw, European alder, Washington hawthorn, eastern redcedar, southern arrowwood	osageorange, arborvitae, blue spruce	Austrian pine, Norway spruce	pin oak, eastern white pine
MmA: Millsdale-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak

Table 15.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
MnA: Milton-----	Japanese tree lilac, Siberian peashrub, redbud	Washington hawthorn, eastern redcedar, radiant crabapple	Austrian pine, osageorange, eastern white pine	---	---
NpA: Nappanee-----	silky dogwood, southern arrowwood	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar	green ash, osageorange, Austrian pine, Norway spruce, arborvitae	Shumard's oak, pin oak	swamp white oak
PaA: Patton-----	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, white fir, arborvitae, Austrian pine	Norway spruce, eastern white pine	pin oak
PmA: Pewamo-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
PoA: Pewamo-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
Urban land.					
Pp, Ps, Pt. Pits					
RdA, ReA, RgA: Rensselaer-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
RoA: Roundhead-----	common ninebark, silky dogwood	nannyberry	black willow	---	---

Table 15.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
SbA, ScA: Saranac-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
SdB: Seward-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	white fir, arborvitae, baldcypress, blue spruce, eastern redcedar	Austrian pine, Norway spruce, green ash, pin oak	eastern white pine
SfB: Shawtown-----	Japanese tree lilac, Siberian peashrub, redbud	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar	Austrian pine, osageorange, blue spruce, eastern white pine, Norway spruce, arborvitae	white oak, white spruce	northern red oak, white ash, eastern white pine
SgC2: Shinrock-----	American cranberrybush, blackhaw	southern arrowwood, Washington hawthorn, eastern redcedar	baldcypress, osageorange, Austrian pine, arborvitae	Norway spruce, green ash, black oak, pin oak	northern red oak
ShA, SkA: Shoals-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
SnA: Sleeth-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	baldcypress, eastern redcedar, arborvitae, Austrian pine	pin oak, Norway spruce	green ash
SoA, SrA: Sloan-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak

Table 15.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
ThB, TkA: Thackery-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	white fir, arborvitae, baldcypress, blue spruce, eastern redcedar	Austrian pine, Norway spruce, green ash, pin oak	eastern white pine
TnA: Tiderishi-----	silky dogwood	American cranberrybush, European alder, Washington hawthorn	baldcypress, eastern redcedar, arborvitae, Austrian pine	pin oak, Norway spruce	green ash
UdA, UdD. Udorthents					
UrB. Urban land					
W. Water					
WdA: Westland-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
WeA: Westland-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak
Rensselaer-----	silky dogwood	American cranberrybush, European alder, baldcypress	Washington hawthorn, arborvitae, Austrian pine, eastern redcedar, green ash	Norway spruce, swamp white oak	pin oak

Table 16.—Recreational Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone	1.00  1.00	Very limited Depth to saturated zone Ponding	1.00  1.00
ArB: Arkport-----	Somewhat limited Too sandy	0.79	Somewhat limited Too sandy	0.79	Somewhat limited Too sandy Slope	0.79 0.50
AuA, AxA: Aurand-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.43	Very limited Depth to saturated zone Restricted permeability	1.00  0.43	Very limited Depth to saturated zone Restricted permeability	1.00  0.43
BoA: Blount-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96
BoB: Blount-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability Slope	1.00  0.96 0.13
BrA: Blount-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96
Jenera-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.21	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.21	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.21
BsA: Blount-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96	Very limited Depth to saturated zone Restricted permeability	1.00  0.96
Urban land-----	Not rated		Not rated		Not rated	

Table 16.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CyA: Cygnet-----	Somewhat limited Depth to saturated zone	0.99	Somewhat limited Depth to saturated zone	0.76	Somewhat limited Depth to saturated zone Gravel content	0.99 0.06
DaA: Darroch-----	Somewhat limited Depth to saturated zone	0.99	Somewhat limited Depth to saturated zone	0.76	Somewhat limited Depth to saturated zone	0.99
EmB: Eldean-----	Not limited		Not limited		Somewhat limited Slope	0.13
FdA: Flatrock-----	Very limited Flooding Depth to saturated zone	1.00 0.99	Somewhat limited Depth to saturated zone	0.76	Somewhat limited Depth to saturated zone Flooding	0.99 0.60
FnB: Fox-----	Not limited		Not limited		Somewhat limited Slope Gravel content	0.50 0.22
FnD2: Fox-----	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope Gravel content	1.00 0.22
FoA: Fox-----	Not limited		Not limited		Not limited	
FpC2: Fox-----	Somewhat limited Slope	0.32	Somewhat limited Slope	0.32	Very limited Slope Gravel content	1.00 0.22
Lybrand-----	Somewhat limited Restricted permeability Slope	0.96 0.32	Somewhat limited Restricted permeability Slope	0.96 0.32	Very limited Slope Restricted permeability	1.00 0.96
GaA: Gallman-----	Not limited		Not limited		Somewhat limited Gravel content	0.06
GaB: Gallman-----	Not limited		Not limited		Somewhat limited Slope Gravel content	0.50 0.06
GaC: Gallman-----	Somewhat limited Slope	0.32	Somewhat limited Slope	0.32	Very limited Slope Gravel content	1.00 0.06

Table 16.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GbA: Gallman-----	Not limited		Not limited		Not limited	
GkA: Glynwood-----	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to	0.99	Restricted	0.96	Depth to	0.99
	saturated zone		permeability		saturated zone	
	Restricted	0.96	Depth to	0.76	Restricted	0.96
	permeability		saturated zone		permeability	
GkB: Glynwood-----	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to	0.99	Restricted	0.96	Depth to	0.99
	saturated zone		permeability		saturated zone	
	Restricted	0.96	Depth to	0.76	Restricted	0.96
	permeability		saturated zone		permeability	
					Slope	0.13
GmC2: Glynwood-----	Somewhat limited		Somewhat limited		Very limited	
	Depth to	0.99	Restricted	0.96	Slope	1.00
	saturated zone		permeability		Depth to	0.99
	Restricted	0.96	Depth to	0.76	saturated zone	
	permeability		saturated zone		Restricted	0.96
	Slope	0.32	Slope	0.32	permeability	
GnB: Glynwood-----	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to	0.99	Restricted	0.96	Depth to	0.99
	saturated zone		permeability		saturated zone	
	Restricted	0.96	Depth to	0.76	Restricted	0.96
	permeability		saturated zone		permeability	
					Slope	0.50
GnC: Glynwood-----	Somewhat limited		Somewhat limited		Very limited	
	Depth to	0.99	Restricted	0.96	Slope	1.00
	saturated zone		permeability		Depth to	0.99
	Restricted	0.96	Depth to	0.76	saturated zone	
	permeability		saturated zone		Restricted	0.96
	Slope	0.32	Slope	0.32	permeability	
GrB2: Glynwood-----	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to	0.99	Restricted	0.96	Depth to	0.99
	saturated zone		permeability		saturated zone	
	Restricted	0.96	Depth to	0.76	Restricted	0.96
	permeability		saturated zone		permeability	
					Slope	0.50
GrC2: Glynwood-----	Somewhat limited		Somewhat limited		Very limited	
	Depth to	0.99	Restricted	0.96	Slope	1.00
	saturated zone		permeability		Depth to	0.99
	Restricted	0.96	Depth to	0.76	saturated zone	
	permeability		saturated zone		Restricted	0.96
	Slope	0.32	Slope	0.32	permeability	

Table 16.--Recreational Development, Part I--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GuB: Glynwood-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.96	Somewhat limited Restricted permeability Depth to saturated zone	0.96  0.76	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.99  0.96 0.50
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Very limited Flooding Depth to saturated zone Restricted permeability	1.00  0.99 0.60	Somewhat limited Depth to saturated zone Restricted permeability Flooding	0.76  0.60 0.40	Very limited Flooding Depth to saturated zone Restricted permeability	1.00 0.99 0.60
HpA: Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.43	Somewhat limited Depth to saturated zone Restricted permeability Gravel content	0.99  0.43 0.06
HpB: Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.43	Somewhat limited Depth to saturated zone Restricted permeability Slope Gravel content	0.99  0.43 0.13 0.06
HrA: Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43
HrB: Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.43	Somewhat limited Depth to saturated zone Slope Restricted permeability	0.99  0.50 0.43
HsA: Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43

Table 16.--Recreational Development, Part I--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
<b>HsB:</b> Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability	0.99  0.43	Somewhat limited Depth to saturated zone Restricted permeability	0.76  0.43	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.99  0.43 0.13
<b>HuC2:</b> Houcktown-----	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.99  0.43 0.32	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.76  0.43 0.32	Very limited Slope Depth to saturated zone Restricted permeability	1.00 0.99 0.43
Glynwood-----	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.99  0.96 0.32	Somewhat limited Restricted permeability Depth to saturated zone Slope	0.96  0.76 0.32	Very limited Slope Depth to saturated zone Restricted permeability	1.00 0.99 0.96
<b>HvA:</b> Hoytville-----	Very limited Depth to saturated zone Ponding Restricted permeability	1.00  1.00 0.21	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.21	Very limited Depth to saturated zone Ponding Restricted permeability	1.00 1.00 0.21
<b>KnA:</b> Knoxdale-----	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
<b>LbF, LcD2:</b> Lybrand-----	Very limited Slope Restricted permeability	1.00 0.96	Very limited Slope Restricted permeability	1.00 0.96	Very limited Slope Restricted permeability	1.00 0.96
<b>MbA:</b> Medway-----	Very limited Flooding Depth to saturated zone	1.00 0.99	Somewhat limited Depth to saturated zone	0.76	Somewhat limited Depth to saturated zone Flooding	0.99 0.60
<b>MmA:</b> Millsdale-----	Very limited Depth to saturated zone Ponding Restricted permeability	1.00  1.00 0.21	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.21	Very limited Depth to saturated zone Ponding Restricted permeability Gravel content	1.00 1.00 0.21 0.06

Table 16.--Recreational Development, Part I--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MnA: Milton-----	Somewhat limited Depth to saturated zone	0.12	Somewhat limited Depth to saturated zone	0.06	Somewhat limited Depth to saturated zone	0.12
NpA: Nappanee-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
	Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
PaA: Patton-----	Very limited Depth to saturated zone	1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
	Ponding	1.00			Ponding	1.00
PmA: Pewamo-----	Very limited Depth to saturated zone	1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
	Ponding	1.00			Ponding	1.00
	Restricted permeability	0.21	Restricted permeability	0.21	Restricted permeability	0.21
PoA: Pewamo-----	Very limited Depth to saturated zone	1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
	Ponding	1.00			Ponding	1.00
	Restricted permeability	0.21	Restricted permeability	0.21	Restricted permeability	0.21
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Very limited Depth to saturated zone	1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
	Ponding	1.00			Ponding	1.00
RoA: Roundhead-----	Very limited Depth to saturated zone	1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
	Ponding	1.00			Content of organic matter	1.00
	Content of organic matter	1.00	Content of organic matter	1.00	Ponding	1.00
	Restricted permeability	0.43	Restricted permeability	0.43	Restricted permeability	0.43

Table 16.—Recreational Development, Part I—Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SbA: Saranac-----	Very limited Depth to saturated zone Flooding Ponding Restricted permeability	1.00 1.00 1.00 0.43	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.43	Very limited Depth to saturated zone Ponding Restricted permeability	1.00 1.00 0.43
ScA: Saranac-----	Very limited Depth to saturated zone Flooding Ponding Restricted permeability	1.00 1.00 1.00 0.43	Very limited Ponding Depth to saturated zone Restricted permeability Flooding	1.00 1.00 0.43 0.40	Very limited Depth to saturated zone Flooding Ponding Restricted permeability	1.00 1.00 1.00 0.43
SdB: Seward-----	Somewhat limited Too sandy Depth to saturated zone	0.85 0.12	Somewhat limited Too sandy Depth to saturated zone	0.85 0.06	Somewhat limited Too sandy Slope Depth to saturated zone	0.85 0.13 0.12
SfB: Shawtown-----	Not limited		Not limited		Somewhat limited Slope Gravel content	0.50 0.06
SgC2: Shinrock-----	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.99 0.43 0.32	Somewhat limited Depth to saturated zone Restricted permeability Slope	0.76 0.43 0.32	Very limited Slope Depth to saturated zone Restricted permeability	1.00 0.99 0.43
ShA, SkA: Shoals-----	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
SnA: Sleeth-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
SoA: Sloan-----	Very limited Depth to saturated zone Flooding Ponding	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Ponding Flooding	1.00 1.00 0.60

Table 16.--Recreational Development, Part I--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SrA: Sloan-----	Very limited Depth to saturated zone Flooding Ponding	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.40	Very limited Depth to saturated zone Flooding Ponding	1.00 1.00 1.00
ThB, TkA: Thackery-----	Somewhat limited Depth to saturated zone	0.84	Somewhat limited Depth to saturated zone	0.50	Somewhat limited Depth to saturated zone	0.84
TnA: Tiderishi-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
WeA: Westland-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
Rensselaer-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00

Table 16.--Recreational Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Paths and trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
ArB: Arkport-----	Somewhat limited Too sandy	0.79	Somewhat limited Droughty	0.02
AuA, AxA: Aurand-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
BoA, BoB: Blount-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
BrA: Blount-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Jenera-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
BsA: Blount-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	Not rated		Not rated	
CyA: Cygnet-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
DaA: Darroch-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
EmB: Eldean-----	Not limited		Very limited Carbonate content	1.00

Table 16.--Recreational Development, Part II--Continued

Map symbol and soil name	Paths and trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value
FdA: Flatrock-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone Flooding	0.75 0.60
FnB: Fox-----	Not limited		Not limited	
FnD2: Fox-----	Very limited Water erosion Slope	1.00 0.11	Very limited Slope	1.00
FoA: Fox-----	Not limited		Not limited	
FpC2: Fox-----	Very limited Water erosion	1.00	Somewhat limited Slope Droughty	0.32 0.02
Lybrand-----	Very limited Water erosion	1.00	Somewhat limited Slope	0.32
GaA, GaB: Gallman-----	Not limited		Not limited	
GaC: Gallman-----	Not limited		Somewhat limited Slope	0.32
GbA: Gallman-----	Not limited		Not limited	
GkA, GkB: Glynwood-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
GmC2: Glynwood-----	Very limited Water erosion Depth to saturated zone	1.00 0.44	Somewhat limited Depth to saturated zone Slope	0.75 0.32
GnB: Glynwood-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
GnC: Glynwood-----	Very limited Water erosion Depth to saturated zone	1.00 0.44	Somewhat limited Depth to saturated zone Slope	0.75 0.32
GrB2: Glynwood-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75

Table 16.--Recreational Development, Part II--Continued

Map symbol and soil name	Paths and trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value
GrC2: Glynwood-----	Very limited Water erosion Depth to saturated zone	1.00 0.44	Somewhat limited Depth to saturated zone Slope	0.75 0.32
GuB: Glynwood-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
Urban land-----	Not rated		Not rated	
HgA: Harrod-----	Somewhat limited Depth to saturated zone Flooding	0.44 0.40	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 0.75 0.23
HpA, HpB, HrA, HrB, HsA, HsB: Houcktown-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone	0.75
HuC2: Houcktown-----	Very limited Water erosion Depth to saturated zone	1.00 0.44 0.44	Somewhat limited Depth to saturated zone Slope	0.75 0.32
Glynwood-----	Very limited Water erosion Depth to saturated zone	1.00 0.44	Somewhat limited Depth to saturated zone Slope	0.75 0.32
HvA: Hoytville-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
KnA: Knoxdale-----	Not limited		Somewhat limited Flooding	0.60
LbF: Lybrand-----	Very limited Water erosion Slope	1.00 1.00	Very limited Slope	1.00
LcD2: Lybrand-----	Very limited Water erosion Slope	1.00 0.19	Very limited Slope	1.00

Table 16.--Recreational Development, Part II--Continued

Map symbol and soil name	Paths and trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value
MbA: Medway-----	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone Flooding	0.75 0.60
MmA: Millsdale-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone Depth to bedrock	1.00 1.00 0.10
MnA: Milton-----	Not limited		Somewhat limited Depth to bedrock Depth to saturated zone	0.65 0.05
NpA: Nappanee-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
PaA: Patton-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
PmA: Pewamo-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
PoA: Pewamo-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
Urban land-----	Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
RoA: Roundhead-----	Very limited Depth to saturated zone Content of organic matter Ponding	1.00 1.00 1.00	Very limited Ponding Content of organic matter Depth to saturated zone	1.00 1.00 1.00

Table 16.--Recreational Development, Part II--Continued

Map symbol and soil name	Paths and trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value
SbA: Saranac-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
ScA: Saranac-----	Very limited Depth to saturated zone Ponding Flooding	1.00  1.00 0.40	Very limited Ponding Flooding Depth to saturated zone	1.00 1.00 1.00
SdB: Seward-----	Somewhat limited Too sandy	0.85	Somewhat limited Depth to saturated zone	0.05
SfB: Shawtown-----	Not limited		Not limited	
SgC2: Shinrock-----	Very limited Water erosion Depth to saturated zone	1.00 0.44	Somewhat limited Depth to saturated zone Slope	0.75 0.32
ShA, SkA: Shoals-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
SnA: Sleeth-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
SoA: Sloan-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.60
SrA: Sloan-----	Very limited Depth to saturated zone Ponding Flooding	1.00  1.00 0.40	Very limited Ponding Flooding Depth to saturated zone	1.00 1.00 1.00
ThB, TkA: Thackery-----	Somewhat limited Depth to saturated zone	0.11	Somewhat limited Depth to saturated zone	0.48
TnA: Tiderishi-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00

Table 16.--Recreational Development, Part II--Continued

Map symbol and soil name	Paths and trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value
UdA, UdD: Udorthents-----	Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated	
W: Water-----	Not rated		Not rated	
WdA: Westland-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone	1.00  1.00
WeA: Westland-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone	1.00  1.00
Rensselaer-----	Very limited Depth to saturated zone Ponding	1.00  1.00	Very limited Ponding Depth to saturated zone	1.00  1.00

Table 17.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AkA, AmA: Alvada-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ArB: Arkport-----	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
AuA, AxA: Aurand-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BoA: Blount-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BoB: Blount-----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BrA: Blount-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Jenera-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BsA: Blount-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Urban land.										
CyA: Cygnet-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DaA: Darroch-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
EmB: Eldean-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FdA: Flatrock-----	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FnB: Fox-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FnD2: Fox-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FoA: Fox-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

Table 17.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
FpC2: Fox-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Lybrand-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaA, GaB: Gallman-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GaC: Gallman-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GbA: Gallman-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GkA: Glynwood-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GkB: Glynwood-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GmC2: Glynwood-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GnB: Glynwood-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GnC: Glynwood-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GrB2: Glynwood-----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GrC2: Glynwood-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GuB: Glynwood-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
HgA: Harrod-----	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
HpA: Houcktown----	Poor	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HpB: Houcktown----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

Table 17.—Wildlife Habitat—Continued

[illegible]

Table 17.—Wildlife Habitat—Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Pp, Ps, Pt. Pits										
RdA, ReA, RgA: Rensselaer----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
RoA: Roundhead----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
SbA, ScA: Saranac-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
SdB: Seward-----	Poor	Fair	Good	Fair	Good	Poor	Very poor.	Fair	Fair	Very poor.
SfB: Shawtown-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SgC2: Shinrock-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ShA, SkA: Shoals-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SnA: Sleeth-----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SoA, SrA: Sloan-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ThB, TkA: Thackery-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
TnA: Tiderishi----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
UdA, UdD. Udorthents										
UrB. Urban land.										
W. Water										
WdA: Westland-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
WeA: Westland-----	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Rensselaer---	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

Table 18.—Construction Materials, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table)

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
AkA, AmA: Alvada-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
ArB: Arkport-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
AuA, AxA: Aurand-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
BoA, BoB: Blount-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
BrA: Blount-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Jenera-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
BsA: Blount-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Urban land-----	Not rated		Not rated	
CyA: Cygnet-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
DaA: Darroch-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
EmB: Eldean-----	Fair		Fair	
	Thickest layer	0.47	Bottom layer	0.85
	Bottom layer	0.89	Thickest layer	0.85

Table 18.—Construction Materials, Part I—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
FdA: Flatrock-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
FnB, FnD2, FoA: Fox-----	Fair		Fair	
	Thickest layer	0.78	Bottom layer	0.89
	Bottom layer	0.93	Thickest layer	0.89
FpC2: Fox-----	Fair		Fair	
	Thickest layer	0.78	Bottom layer	0.89
	Bottom layer	0.93	Thickest layer	0.89
Lybrand-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
GaA, GaB, GaC, GbA: Gallman-----	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.50
GkA, GkB, GmC2, GnB, GnC, GrB2, GrC2: Glynwood-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
GuB: Glynwood-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Urban land-----	Not rated		Not rated	
HgA: Harrod-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
HpA, HpB, HrA, HrB, HsA, HsB: Houcktown-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
HuC2: Houcktown-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Glynwood-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
HvA: Hoytville-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00

Table 18.—Construction Materials, Part I—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
KnA: Knoxdale-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
LbF, LcD2: Lybrand-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
MbA: Medway-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
MmA: Millsdale-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
MnA: Milton-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
NpA: Nappanee-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
PaA: Patton-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
PmA: Pewamo-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
PoA: Pewamo-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Urban land-----	Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
RoA: Roundhead-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00

Table 18.—Construction Materials, Part I—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
SbA, ScA: Saranac-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
SdB: Seward-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
SfB: Shawtown-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
SgC2: Shinrock-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
ShA, SkA: Shoals-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
SnA: Sleeth-----	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.50
SoA, SrA: Sloan-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
ThB, TkA: Thackery-----	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.50
TnA: Tiderishi-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
UdA, UdD: Udorthents-----	Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated	
W: Water-----	Not rated		Not rated	
WdA: Westland-----	Fair		Fair	
	Thickest layer	0.00	Thickest layer	0.00
	Bottom layer	0.91	Bottom layer	0.87

Table 18.—Construction Materials, Part I—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
<b>WeA:</b>				
Westland-----	Fair		Fair	
	Thickest layer	0.00	Thickest layer	0.00
	Bottom layer	0.91	Bottom layer	0.87
Rensselaer-----	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00

Table 18.—Construction Materials, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA: Alvada-----	Fair Carbonate content	0.80	Poor Depth to saturated zone Low strength	0.00 0.78	Poor Depth to saturated zone	0.00
AmA: Alvada-----	Fair Carbonate content	0.80	Poor Depth to saturated zone Low strength	0.00 0.00	Poor Depth to saturated zone	0.00
ArB: Arkport-----	Poor Wind erosion Too sandy Low content of organic matter	0.00 0.00 0.50	Good		Poor Too sandy	0.00
AuA, AxA: Aurand-----	Fair Carbonate content	0.80	Poor Depth to saturated zone	0.00	Poor Depth to saturated zone	0.00
BoA: Blount-----	Fair Low content of organic matter Carbonate content Too clayey Water erosion	0.12 0.39 0.59 0.90	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Hard to reclaim Too clayey Rock fragments	0.00 0.01 0.35 0.88
BoB: Blount-----	Poor Too clayey Carbonate content Low content of organic matter Water erosion	0.00 0.39 0.50 0.90	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Too clayey Hard to reclaim	0.00 0.00 0.54
BrA: Blount-----	Fair Too clayey Low content of organic matter Carbonate content Water erosion	0.01 0.12 0.39 0.90	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Too clayey Hard to reclaim	0.00 0.00 0.20
Jenera-----	Fair Carbonate content Low content of organic matter Water erosion	0.68 0.88 0.99	Fair Depth to saturated zone Low strength	0.14 0.22	Fair Depth to saturated zone	0.14

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BsA: Blount-----	Fair		Poor		Poor	
	Too clayey	0.01	Depth to	0.00	Depth to	0.00
	Carbonate content	0.39	saturated zone		saturated zone	
	Low content of	0.50	Low strength	0.00	Too clayey	0.00
	organic matter		Shrink-swell	0.87	Hard to reclaim	0.80
	Water erosion	0.90				
Urban land-----	Not rated		Not rated		Not rated	
CyA: Cygnet-----	Fair		Fair		Fair	
	Carbonate content	0.46	Depth to	0.14	Depth to	0.14
	Low content of	0.88	saturated zone		saturated zone	
	organic matter				Rock fragments	0.28
DaA: Darroch-----	Fair		Fair		Fair	
	Carbonate content	0.68	Depth to	0.14	Depth to	0.14
	Low content of	0.88	saturated zone		saturated zone	
	organic matter					
	Water erosion	0.99				
EmB: Eldean-----	Poor		Good		Poor	
	Carbonate content	0.00			Carbonate content	0.00
	Too sandy	0.01			Rock fragments	0.00
	Low content of	0.88			Hard to reclaim	0.00
	organic matter				Too sandy	0.01
	Droughty	0.95				
	Water erosion	0.99				
FdA: Flatrock-----	Fair		Poor		Fair	
	Low content of	0.88	Low strength	0.00	Depth to	0.14
	organic matter		Depth to	0.14	saturated zone	
	Water erosion	0.99	saturated zone			
FnB: Fox-----	Fair		Good		Fair	
	Low content of	0.12			Rock fragments	0.28
	organic matter				Hard to reclaim	0.82
	Carbonate content	0.68				
	Water erosion	0.99				
FnD2: Fox-----	Fair		Good		Poor	
	Low content of	0.12			Slope	0.00
	organic matter				Rock fragments	0.28
	Carbonate content	0.68			Hard to reclaim	0.82
	Water erosion	0.99				
FoA: Fox-----	Fair		Good		Fair	
	Low content of	0.12			Rock fragments	0.28
	organic matter				Hard to reclaim	0.82
	Carbonate content	0.68				
	Water erosion	0.99				

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FpC2: Fox-----	Fair		Good		Poor	
	Low content of organic matter	0.12			Rock fragments	0.00
	Too sandy	0.14			Too sandy	0.14
	Carbonate content	0.68			Carbonate content	0.68
	Droughty	0.81			Hard to reclaim	0.82
	Water erosion	0.99			Slope	0.96
Lybrand-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Too clayey	0.00
	Low content of organic matter	0.12	Shrink-swell	0.87	Hard to reclaim	0.65
	Carbonate content	0.46			Slope	0.96
	Water erosion	0.90				
GaA, GaB: Gallman-----	Fair		Good		Fair	
	Low content of organic matter	0.50			Rock fragments	0.12
GaC: Gallman-----	Fair		Good		Fair	
	Low content of organic matter	0.50			Rock fragments	0.12
					Slope	0.96
GbA: Gallman-----	Fair		Good		Fair	
	Low content of organic matter	0.50			Rock fragments	0.12
	Water erosion	0.99			Hard to reclaim	0.92
GkA: Glynwood-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Low content of organic matter	0.88	saturated zone		saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.46
GkB: Glynwood-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Low content of organic matter	0.88	saturated zone		saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.35
GmC2: Glynwood-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Hard to reclaim	0.10
	Droughty	0.87	saturated zone		Depth to	0.14
	Low content of organic matter	0.88	Shrink-swell	0.87	saturated zone	
	Water erosion	0.99			Slope	0.96

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GnB: Glynwood-----	Poor		Poor		Poor	
	Too clayey	0.00	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Low content of organic matter	0.88	saturated zone		saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.97
GnC: Glynwood-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Low content of organic matter	0.88	saturated zone		saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.54
					Slope	0.96
GrB2: Glynwood-----	Poor		Poor		Poor	
	Too clayey	0.00	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Low content of organic matter	0.88	saturated zone		saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.65
GrC2: Glynwood-----	Fair		Poor		Poor	
	Low content of organic matter	0.12	Low strength	0.00	Hard to reclaim	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Too clayey	0.59	saturated zone		saturated zone	
	Droughty	0.81	Shrink-swell	0.87	Too clayey	0.35
	Water erosion	0.90			Slope	0.96
					Rock fragments	0.97
GuB: Glynwood-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Too clayey	0.00
	Carbonate content	0.39	Depth to	0.14	Depth to	0.14
	Low content of organic matter	0.88	saturated zone		saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.16
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Fair		Poor		Fair	
	Depth to bedrock	0.77	Depth to bedrock	0.00	Depth to	0.14
	Droughty	0.98	Depth to	0.14	saturated zone	
			saturated zone		Depth to bedrock	0.77
			Low strength	0.22	Rock fragments	0.97
HpA: Houcktown-----	Fair		Poor		Fair	
	Low content of organic matter	0.12	Low strength	0.00	Depth to	0.14
	Carbonate content	0.68	Depth to	0.14	saturated zone	
	Droughty	0.99	saturated zone		Rock fragments	0.50
					Hard to reclaim	0.65

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HpB: Houcktown-----	Fair Carbonate content Droughty	0.68 0.99	Fair Depth to saturated zone	0.14	Fair Depth to saturated zone Rock fragments Hard to reclaim	0.14 0.50 0.54
HrA: Houcktown-----	Fair Carbonate content Water erosion	0.68 0.99	Fair Depth to saturated zone	0.14	Fair Depth to saturated zone Rock fragments Hard to reclaim	0.14 0.50 0.90
HrB: Houcktown-----	Fair Carbonate content Water erosion	0.68 0.99	Fair Depth to saturated zone	0.14	Fair Depth to saturated zone Rock fragments Hard to reclaim	0.14 0.50 0.54
HsA: Houcktown-----	Fair Carbonate content	0.68	Fair Depth to saturated zone	0.14	Fair Depth to saturated zone Rock fragments Hard to reclaim	0.14 0.50 0.54
HsB: Houcktown-----	Fair Low content of organic matter Carbonate content Too clayey Droughty	0.12 0.68 0.92 0.97	Poor Low strength Depth to saturated zone Shrink-swell	0.00 0.14 0.99	Fair Hard to reclaim Depth to saturated zone Too clayey	0.05 0.14 0.53
HuC2: Houcktown-----	Fair Carbonate content Low content of organic matter Water erosion	0.68 0.88 0.99	Fair Depth to saturated zone	0.14	Fair Depth to saturated zone Rock fragments Hard to reclaim Slope	0.14 0.50 0.54 0.96
Glynwood-----	Fair Too clayey Carbonate content Low content of organic matter Droughty Water erosion	0.01 0.39 0.88 0.90 0.99	Poor Low strength Depth to saturated zone Shrink-swell	0.00 0.14 0.87	Poor Too clayey Hard to reclaim Depth to saturated zone Slope	0.00 0.10 0.14 0.96
HvA: Hoytville-----	Poor Too clayey Carbonate content Low content of organic matter	0.00 0.80 0.88	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Too clayey Depth to saturated zone	0.00 0.00

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
KnA: Knoxdale-----	Fair		Poor		Good	
	Low content of organic matter	0.88	Low strength	0.00		
	Water erosion	0.99				
LbF: Lybrand-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Slope	0.00
	Carbonate content	0.46	Slope	0.00	Too clayey	0.00
	Low content of organic matter	0.88	Shrink-swell	0.87	Hard to reclaim	0.54
	Water erosion	0.90				
LcD2: Lybrand-----	Fair		Poor		Poor	
	Too clayey	0.01	Low strength	0.00	Slope	0.00
	Carbonate content	0.46	Shrink-swell	0.87	Too clayey	0.00
	Low content of organic matter	0.88	Slope	0.98	Hard to reclaim	0.99
	Water erosion	0.90				
MbA: Medway-----	Fair		Poor		Fair	
	Low content of organic matter	0.88	Low strength	0.00	Depth to	0.14
			Depth to saturated zone	0.14	saturated zone	
MmA: Millsdale-----	Poor		Poor		Poor	
	Too clayey	0.00	Depth to bedrock	0.00	Depth to	0.00
	Depth to bedrock	0.90	Depth to	0.00	saturated zone	
	Droughty	0.99	saturated zone		Too clayey	0.00
			Low strength	0.00	Depth to bedrock	0.90
			Shrink-swell	0.87	Rock fragments	0.97
MnA: Milton-----	Fair		Poor		Fair	
	Depth to bedrock	0.35	Depth to bedrock	0.00	Depth to bedrock	0.35
	Droughty	0.52	Depth to	0.73	Depth to	0.73
	Low content of organic matter	0.88	saturated zone		saturated zone	
			Low strength	0.78		
NpA: Nappanee-----	Poor		Poor		Poor	
	Too clayey	0.00	Depth to	0.00	Too clayey	0.00
	Low content of organic matter	0.50	saturated zone		Depth to	0.00
	Carbonate content	0.80	Low strength	0.00	saturated zone	
	Water erosion	0.90	Shrink-swell	0.87	Hard to reclaim	0.97
PaA: Patton-----	Fair		Poor		Poor	
	Too clayey	0.32	Depth to	0.00	Depth to	0.00
	Low content of organic matter	0.50	saturated zone		saturated zone	
	Water erosion	0.90	Low strength	0.00	Too clayey	0.30
	Carbonate content	0.99				

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PmA: Pewamo-----	Poor Too clayey Carbonate content	0.00 0.80	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Too clayey	0.00 0.00
PoA: Pewamo-----	Poor Too clayey Carbonate content	0.00 0.80	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Too clayey	0.00 0.00
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA: Rensselaer-----	Fair Water erosion	0.99	Poor Depth to saturated zone	0.00	Poor Depth to saturated zone	0.00
ReA: Rensselaer-----	Fair Carbonate content Water erosion	0.68 0.99	Poor Depth to saturated zone Low strength	0.00 0.00	Poor Depth to saturated zone	0.00
RgA: Rensselaer-----	Fair Water erosion	0.99	Poor Depth to saturated zone Low strength	0.00 0.00	Poor Depth to saturated zone	0.00
RoA: Roundhead-----	Poor Wind erosion Low content of organic matter Carbonate content Water erosion	0.00 0.12 0.68 0.99	Poor Depth to saturated zone	0.00	Poor Depth to saturated zone Rock fragments Carbonate content	0.00 0.88 0.97
SbA: Saranac-----	Poor Too clayey Carbonate content	0.00 0.99	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Too clayey	0.00 0.00
ScA: Saranac-----	Fair Too clayey Carbonate content	0.01 0.80	Poor Depth to saturated zone Low strength Shrink-swell	0.00 0.00 0.87	Poor Depth to saturated zone Too clayey	0.00 0.00

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SdB: Seward-----	Poor		Poor		Fair	
	Wind erosion	0.00	Low strength	0.00	Too sandy	0.02
	Too sandy	0.02	Depth to saturated zone	0.73	Depth to saturated zone	0.73
	Low content of organic matter	0.12				
	Carbonate content	0.39				
SfB: Shawtown-----	Fair		Fair		Fair	
	Low content of organic matter	0.12	Depth to saturated zone	0.98	Rock fragments	0.28
	Carbonate content	0.80			Depth to saturated zone	0.98
SgC2: Shinrock-----	Poor		Poor		Poor	
	Too clayey	0.00	Low strength	0.00	Too clayey	0.00
	Low content of organic matter	0.12	Depth to saturated zone	0.14	Depth to saturated zone	0.14
	Carbonate content	0.97			Slope	0.96
	Water erosion	0.99				
ShA: Shoals-----	Good		Poor		Poor	
			Low strength	0.00	Depth to saturated zone	0.00
			Depth to saturated zone	0.00		
SkA: Shoals-----	Fair		Poor		Poor	
	Carbonate content	0.80	Low strength	0.00	Depth to saturated zone	0.00
			Depth to saturated zone	0.00		
SnA: Sleeth-----	Fair		Poor		Poor	
	Carbonate content	0.01	Depth to saturated zone	0.00	Depth to saturated zone	0.00
	Low content of organic matter	0.88	Low strength	0.78	Hard to reclaim	0.68
	Water erosion	0.99				
SoA: Sloan-----	Fair		Poor		Poor	
	Low content of organic matter	0.88	Depth to saturated zone	0.00	Depth to saturated zone	0.00
	Carbonate content	0.92	Low strength	0.00		
SrA: Sloan-----	Fair		Poor		Poor	
	Carbonate content	0.80	Depth to saturated zone	0.00	Depth to saturated zone	0.00
	Low content of organic matter	0.88	Low strength	0.00		
ThB, TkA: Thackery-----	Fair		Fair		Fair	
	Carbonate content	0.54	Depth to saturated zone	0.29	Depth to saturated zone	0.29
	Low content of organic matter	0.88	Low strength	0.78		
	Water erosion	0.99				

Table 18.—Construction Materials, Part II—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TnA: Tiderishi-----	Fair Carbonate content Low content of organic matter	0.68 0.88	Poor Depth to saturated zone	0.00	Poor Depth to saturated zone	0.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Fair Carbonate content	0.08	Poor Depth to saturated zone Low strength	0.00 0.22	Poor Depth to saturated zone Hard to reclaim Rock fragments	0.00 0.08 0.97
WeA: Westland-----	Fair Carbonate content	0.08	Poor Depth to saturated zone Low strength	0.00 0.22	Poor Depth to saturated zone Hard to reclaim, rock fragments Rock fragments	0.00 0.08 0.97
Rensselaer-----	Fair Low content of organic matter Water erosion	0.50 0.99	Poor Depth to saturated zone	0.00	Poor Depth to saturated zone	0.00

Table 19.—Building Site Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
ArB: Arkport-----	Not limited		Not limited		Somewhat limited Slope	0.10
AuA, AxA: Aurand-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
BoA, BoB: Blount-----	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
BrA: Blount-----	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
Jenera-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.99
BsA: Blount-----	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
Urban land-----	Not rated		Not rated		Not rated	
CyA: Cygnet-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.99
DaA: Darroch-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.99
EmB: Eldean-----	Not limited		Not limited		Not limited	

Table 19.—Building Site Development, Part I—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FdA: Flatrock-----	Very limited Flooding Depth to saturated zone	1.00 0.99	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 0.99
FnB: Fox-----	Not limited		Not limited		Somewhat limited Slope	0.10
FnD2: Fox-----	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
FoA: Fox-----	Not limited		Not limited		Not limited	
FpC2: Fox-----	Somewhat limited Slope	0.32	Somewhat limited Slope	0.32	Very limited Slope	1.00
Lybrand-----	Somewhat limited Shrink-swell Slope	0.50 0.32	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.53 0.50 0.32	Very limited Slope Shrink-swell	1.00 0.50
GaA: Gallman-----	Not limited		Not limited		Not limited	
GaB: Gallman-----	Not limited		Not limited		Somewhat limited Slope	0.10
GaC: Gallman-----	Somewhat limited Slope	0.32	Somewhat limited Slope	0.32	Very limited Slope	1.00
GbA: Gallman-----	Not limited		Somewhat limited Depth to saturated zone	0.16	Not limited	
GkA, GkB: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50
GmC2: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.32	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.50 0.32	Very limited Slope Depth to saturated zone Shrink-swell	1.00 0.99 0.50

Table 19.—Building Site Development, Part I—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GnB: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.10
GnC: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.32	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.50 0.32	Very limited Slope Depth to saturated zone Shrink-swell	1.00 0.99 0.50
GrB2: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.10
GrC2: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.32	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.50 0.32	Very limited Slope Depth to saturated zone Shrink-swell	1.00 0.99 0.50
GuB: Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.10
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 0.99 0.23	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 0.99 0.23
HpA: Houcktown-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone	0.99
HpB, HrA: Houcktown-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.99
HrB: Houcktown-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone Slope	0.99 0.10

Table 19.—Building Site Development, Part I—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HsA: Houcktown-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.99
HsB: Houcktown-----	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Depth to saturated zone Shrink-swell	0.99 0.50
HuC2: Houcktown-----	Somewhat limited Depth to saturated zone Slope	0.99 0.32	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.50 0.32	Very limited Slope Depth to saturated zone	1.00 0.99
Glynwood-----	Somewhat limited Depth to saturated zone Shrink-swell Slope	0.99 0.50 0.32	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.50 0.32	Very limited Slope Depth to saturated zone Shrink-swell	1.00 0.99 0.50
HvA: Hoytville-----	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50
KnA: Knoxdale-----	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.24	Very limited Flooding	1.00
LbF, LcD2: Lybrand-----	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Depth to saturated zone Shrink-swell	1.00 0.53 0.50	Very limited Slope Shrink-swell	1.00 0.50
MbA: Medway-----	Very limited Flooding Depth to saturated zone	1.00 0.99	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 0.99
MmA: Millsdale-----	Very limited Ponding Depth to saturated zone Shrink-swell Depth to bedrock	1.00 1.00 0.50 0.10	Very limited Ponding Depth to saturated zone Depth to bedrock Shrink-swell	1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell Depth to bedrock	1.00 1.00 0.50 0.10

Table 19.—Building Site Development, Part I—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MnA: Milton-----	Somewhat limited Depth to bedrock Depth to saturated zone	0.64 0.12	Very limited Depth to bedrock Depth to saturated zone	1.00 1.00	Somewhat limited Depth to bedrock Depth to saturated zone	0.64 0.12
NpA: Nappanee-----	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
PaA: Patton-----	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50
PmA: Pewamo-----	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50
PoA: Pewamo-----	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Shrink-swell	1.00 1.00 0.50
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
RoA: Roundhead-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
SbA, ScA: Saranac-----	Very limited Ponding Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00 0.50	Very limited Ponding Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00 0.50	Very limited Ponding Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00 0.50

Table 19.—Building Site Development, Part I—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SdB: Seward-----	Somewhat limited Depth to saturated zone	0.12	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.12
SfB: Shawtown-----	Not limited		Somewhat limited Depth to saturated zone	0.99	Somewhat limited Slope	0.10
SgC2: Shinrock-----	Somewhat limited Depth to saturated zone	0.99	Very limited Depth to saturated zone Slope	1.00	Very limited Slope	1.00
	Shrink-swell	0.50		0.32	Depth to saturated zone	0.99
	Slope	0.32			Shrink-swell	0.50
ShA, SkA: Shoals-----	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00	Very limited Flooding Depth to saturated zone	1.00
	Depth to saturated zone	1.00		1.00		1.00
SnA: Sleeth-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
SoA, SrA: Sloan-----	Very limited		Very limited Ponding Flooding Depth to saturated zone		Very limited Ponding Flooding Depth to saturated zone	
	Ponding	1.00		1.00		1.00
	Flooding	1.00		1.00		1.00
	Depth to saturated zone	1.00		1.00		1.00
ThB, TkA: Thackery-----	Somewhat limited Depth to saturated zone	0.84	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.84
TnA: Tiderishi-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Very limited		Very limited Ponding Depth to saturated zone		Very limited Ponding Depth to saturated zone	
	Ponding Depth to saturated zone	1.00 1.00		1.00 1.00		1.00 1.00

Table 19.—Building Site Development, Part I—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WeA: Westland-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
Rensselaer-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 19.—Building Site Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Ponding Depth to saturated zone Frost action Low strength	1.00 1.00  1.00 0.28	Very limited Ponding Depth to saturated zone	1.00 1.00  1.00	Very limited Ponding Depth to saturated zone	1.00 1.00  1.00
ArB: Arkport-----	Somewhat limited Frost action	0.50	Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.01
AuA, AxA: Aurand-----	Very limited Frost action Depth to saturated zone	1.00 1.00  1.00	Very limited Depth to saturated zone Depth to dense layer	1.00 1.00 0.50	Very limited Depth to saturated zone	1.00
BoA, BoB: Blount-----	Very limited Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Depth to dense layer Too clayey	1.00 1.00 0.50 0.50	Very limited Depth to saturated zone	1.00
BrA: Blount-----	Very limited Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Depth to dense layer	1.00 1.00 0.50	Very limited Depth to saturated zone	1.00
Jenera-----	Very limited Frost action Depth to saturated zone Low strength	1.00 0.75 0.50	Very limited Depth to saturated zone Depth to dense layer	1.00 1.00 0.50	Somewhat limited Depth to saturated zone	0.75
BsA: Blount-----	Very limited Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Depth to dense layer	1.00 1.00 0.50	Very limited Depth to saturated zone	1.00
Urban land-----	Not rated		Not rated		Not rated	

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CyA: Cygnets-----	Very limited Frost action Depth to saturated zone	1.00 0.75	Very limited Depth to saturated zone Depth to dense layer	1.00 0.50	Somewhat limited Depth to saturated zone	0.75
DaA: Darroch-----	Very limited Frost action Depth to saturated zone	1.00 0.75	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.75
EmB: Eldean-----	Somewhat limited Frost action	0.50	Very limited Cutbanks cave Too clayey	1.00 0.50	Very limited Carbonate content	1.00
FdA: Flatrock-----	Very limited Frost action Flooding Low strength Depth to saturated zone	1.00 1.00 1.00 0.75	Very limited Depth to saturated zone Flooding	1.00 0.60	Somewhat limited Depth to saturated zone Flooding	0.75 0.60
FnB: Fox-----	Somewhat limited Frost action Low strength	0.50 0.05	Very limited Cutbanks cave	1.00	Not limited	
FnD2: Fox-----	Very limited Slope Frost action Low strength	1.00 0.50 0.05	Very limited Cutbanks cave Slope	1.00 1.00	Very limited Slope	1.00
FoA: Fox-----	Somewhat limited Frost action Low strength	0.50 0.05	Very limited Cutbanks cave Too clayey	1.00 0.50	Not limited	
FpC2: Fox-----	Somewhat limited Frost action Slope	0.50 0.32	Very limited Cutbanks cave Slope	1.00 0.32	Somewhat limited Slope Droughty	0.04 0.02
Lybrand-----	Very limited Low strength Shrink-swell Frost action Slope	1.00 0.50 0.50 0.32	Somewhat limited Depth to saturated zone Depth to dense layer Slope	0.53 0.50 0.32	Somewhat limited Slope	0.04
GaA, GaB: Gallman-----	Somewhat limited Frost action	0.50	Not limited		Not limited	

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GaC: Gallman-----	Somewhat limited Frost action Slope	0.50 0.32	Somewhat limited Slope	0.32	Somewhat limited Slope	0.04
GbA: Gallman-----	Somewhat limited Frost action	0.50	Somewhat limited Depth to saturated zone	0.16	Not limited	
GkA, GkB: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell	1.00 1.00 0.75 0.50	Very limited Depth to saturated zone Depth to dense layer	1.00 0.50	Somewhat limited Depth to saturated zone	0.75
GmC2: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell Slope	1.00 1.00 0.75 0.50 0.32	Very limited Depth to saturated zone Depth to dense layer Slope	1.00 0.50 0.32	Somewhat limited Depth to saturated zone Slope	0.75 0.04
GnB: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell	1.00 1.00 0.75 0.50	Very limited Depth to saturated zone Depth to dense layer Too clayey	1.00 0.50 0.50	Somewhat limited Depth to saturated zone	0.75
GnC: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell Slope	1.00 1.00 0.75 0.50 0.32	Very limited Depth to saturated zone Depth to dense layer Slope	1.00 0.50 0.32	Somewhat limited Depth to saturated zone Slope	0.75 0.04
GrB2: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell	1.00 1.00 0.75 0.50	Very limited Depth to saturated zone Depth to dense layer Too clayey	1.00 0.50 0.50	Somewhat limited Depth to saturated zone	0.75
GrC2: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell Slope	1.00 1.00 0.75 0.50 0.32	Very limited Depth to saturated zone Depth to dense layer Slope	1.00 0.50 0.32	Somewhat limited Depth to saturated zone Slope	0.75 0.04

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GuB: Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell	1.00 1.00 0.75 0.50	Very limited Depth to saturated zone Depth to dense layer	1.00 0.50	Somewhat limited Depth to saturated zone	0.75
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Very limited Frost action Flooding Depth to saturated zone Low strength Depth to bedrock	1.00 1.00 0.75 0.50 0.23	Very limited Depth to bedrock Depth to saturated zone Flooding	1.00 1.00 0.80	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 0.75 0.23
HpA, HpB, HrA, HrB, HsA: Houcktown-----	Very limited Frost action Depth to saturated zone	1.00 0.75	Very limited Depth to saturated zone Depth to dense layer	1.00 0.50	Somewhat limited Depth to saturated zone	0.75
HsB: Houcktown-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell	1.00 1.00 0.75 0.50	Very limited Depth to saturated zone Depth to dense layer	1.00 0.50	Somewhat limited Depth to saturated zone	0.75
HuC2: Houcktown-----	Very limited Frost action Depth to saturated zone Slope	1.00 0.75 0.32	Very limited Depth to saturated zone Depth to dense layer Slope	1.00 0.50 0.32	Somewhat limited Depth to saturated zone Slope	0.75 0.04
Glynwood-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell Slope	1.00 1.00 0.75 0.50 0.32	Very limited Depth to saturated zone Depth to dense layer Slope	1.00 0.50 0.32	Somewhat limited Depth to saturated zone Slope	0.75 0.04
HvA: Hoytville-----	Very limited Ponding Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
<b>KnA:</b> Knoxdale-----	Very limited Frost action Flooding Low strength	1.00 1.00 1.00	Somewhat limited Flooding Depth to saturated zone	0.60 0.24	Somewhat limited Flooding	0.60
<b>LbF, LcD2:</b> Lybrand-----	Very limited Slope Low strength Shrink-swell Frost action	1.00 1.00 0.50 0.50	Very limited Slope Depth to saturated zone Depth to dense layer	1.00 0.53 0.50	Very limited Slope	1.00
<b>MbA:</b> Medway-----	Very limited Frost action Flooding Low strength Depth to saturated zone	1.00 1.00 0.90 0.75	Very limited Depth to saturated zone Flooding	1.00 0.60	Somewhat limited Depth to saturated zone Flooding	0.75 0.60
<b>MnA:</b> Millsdale-----	Very limited Ponding Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Depth to bedrock Ponding Depth to saturated zone Too clayey	1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Depth to bedrock	1.00 1.00 0.10
<b>MnA:</b> Milton-----	Somewhat limited Depth to bedrock Frost action Low strength Depth to saturated zone	0.64 0.50 0.28 0.05	Very limited Depth to bedrock Depth to saturated zone Too clayey	1.00 1.00 0.50	Somewhat limited Depth to bedrock Depth to saturated zone	0.65 0.05
<b>NpA:</b> Nappanee-----	Very limited Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00
<b>PaA:</b> Patton-----	Very limited Ponding Depth to saturated zone Frost action Low strength Shrink-swell	1.00 1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PmA: Pewamo-----	Very limited Ponding Depth to saturated zone Frost action Low strength Shrink-swell	 1.00 1.00  1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Too clayey	 1.00 1.00  0.50	Very limited Ponding Depth to saturated zone	 1.00 1.00  
PoA: Pewamo-----	Very limited Ponding Depth to saturated zone Frost action Low strength Shrink-swell	 1.00 1.00  1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Too clayey	 1.00 1.00  0.50	Very limited Ponding Depth to saturated zone	 1.00 1.00  
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Very limited Ponding Depth to saturated zone Frost action Low strength	 1.00 1.00  1.00 1.00	Very limited Ponding Depth to saturated zone Cutbanks cave	 1.00 1.00  1.00	Very limited Ponding Depth to saturated zone	 1.00 1.00  
RoA: Roundhead-----	Very limited Ponding Depth to saturated zone Frost action	 1.00 1.00  1.00	Very limited Ponding Depth to saturated zone Cutbanks cave Too clayey	 1.00 1.00  1.00 0.50	Very limited Ponding Content of organic matter Depth to saturated zone	 1.00 1.00  1.00
SbA: Saranac-----	Very limited Ponding Depth to saturated zone Frost action Low strength Shrink-swell	 1.00 1.00  1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Too clayey	 1.00 1.00  0.50	Very limited Ponding Depth to saturated zone	 1.00 1.00  
ScA: Saranac-----	Very limited Ponding Depth to saturated zone Frost action Flooding Low strength	 1.00 1.00  1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding	 1.00 1.00  0.80	Very limited Ponding Flooding Depth to saturated zone	 1.00 1.00  1.00

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SdB: Seward-----	Somewhat limited Frost action Depth to saturated zone	0.50 0.05	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Somewhat limited Depth to saturated zone	0.05
SfB: Shawtown-----	Somewhat limited Frost action	0.50	Very limited Cutbanks cave Depth to saturated zone	1.00 0.99	Not limited	
SgC2: Shinrock-----	Very limited Frost action Low strength Depth to saturated zone Shrink-swell Slope	1.00 1.00 0.75 0.50 0.32	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.32	Somewhat limited Depth to saturated zone Slope	0.75 0.04
ShA, SkA: Shoals-----	Very limited Frost action Flooding Low strength Depth to saturated zone	1.00 1.00 1.00 1.00	Very limited Depth to saturated zone Flooding	1.00 0.60	Very limited Depth to saturated zone Flooding	1.00 0.60
SnA: Sleeth-----	Very limited Frost action Depth to saturated zone Low strength	1.00 1.00 0.28	Very limited Depth to saturated zone Cutbanks cave	1.00 1.00	Very limited Depth to saturated zone	1.00
SoA: Sloan-----	Very limited Ponding Depth to saturated zone Frost action Flooding Low strength	1.00 1.00 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.60	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.60
SrA: Sloan-----	Very limited Ponding Depth to saturated zone Frost action Flooding Low strength	1.00 1.00 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.80	Very limited Ponding Flooding Depth to saturated zone	1.00 1.00 1.00
ThB: Thackery-----	Very limited Frost action Depth to saturated zone Low strength	1.00 0.48 0.28	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone	0.48

Table 19.—Building Site Development, Part II—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TkA: Thackery-----	Very limited Frost action Depth to saturated zone Low strength	1.00 0.48 0.28	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Somewhat limited Depth to saturated zone	0.48
TnA: Tiderishi-----	Very limited Frost action Depth to saturated zone Low strength	1.00 1.00 0.05	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Very limited Ponding Depth to saturated zone Frost action Low strength	1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Cutbanks cave	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
WeA: Westland-----	Very limited Ponding Depth to saturated zone Frost action Low strength	1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone Cutbanks cave	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
Rensselaer-----	Very limited Ponding Depth to saturated zone Frost action Low strength	1.00 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Cutbanks cave	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 20.—Sanitary Facilities, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Seepage	1.00 1.00 0.53
ArB: Arkport-----	Not limited		Very limited Seepage Slope	1.00 0.32
AuA, AxA: Aurand-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53
BoA: Blount-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
BoB: Blount-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Slope	1.00 0.08
BrA: Blount-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
Jenera-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53
BsA: Blount-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
Urban land-----	Not rated		Not rated	

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
CyA: Cygnet-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53
DaA: Darroch-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.46	Very limited Depth to saturated zone Seepage	1.00 0.53
EmB: Eldean-----	Very limited Filtering capacity Restricted permeability	1.00 0.46	Very limited Seepage Slope	1.00 0.08
FdA: Flatrock-----	Very limited Flooding Depth to saturated zone Restricted permeability Depth to bedrock	1.00 1.00 0.46 0.11	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00
FnB: Fox-----	Very limited Filtering capacity Restricted permeability	1.00 0.46	Very limited Seepage Slope	1.00 0.32
FnD2: Fox-----	Very limited Filtering capacity Slope Restricted permeability	1.00 1.00 0.46	Very limited Slope Seepage	1.00 1.00
FoA: Fox-----	Very limited Filtering capacity Restricted permeability	1.00 0.72	Very limited Seepage	1.00
FpC2: Fox-----	Very limited Filtering capacity Slope	1.00 0.32	Very limited Seepage Slope	1.00 1.00

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
FpC2: Lybrand-----	Very limited Restricted permeability Depth to saturated zone Slope	1.00 0.97 0.32	Very limited Slope Depth to saturated zone	1.00 0.52
GaA: Gallman-----	Not limited		Very limited Seepage	1.00
GaB: Gallman-----	Not limited		Very limited Seepage Slope	1.00 0.32
GaC: Gallman-----	Somewhat limited Slope	0.32	Very limited Seepage Slope	1.00 1.00
GbA: Gallman-----	Very limited Filtering capacity Depth to saturated zone	1.00 0.43	Very limited Seepage	1.00
GkA: Glynwood-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
GkB: Glynwood-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Slope	1.00 0.08
GmC2: Glynwood-----	Very limited Restricted permeability Depth to saturated zone Slope	1.00 1.00 0.32	Very limited Depth to saturated zone Slope	1.00 1.00
GnB: Glynwood-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Slope	1.00 0.32

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
GnC: Glynwood-----	Very limited Restricted permeability Depth to saturated zone Slope	1.00 1.00 0.32	Very limited Depth to saturated zone Slope	1.00 1.00
GrB2: Glynwood-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Slope	1.00 0.32
GrC2: Glynwood-----	Very limited Restricted permeability Depth to saturated zone Slope	1.00 1.00 0.32	Very limited Depth to saturated zone Slope	1.00 1.00
GuB: Glynwood-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Slope	1.00 0.32
Urban land-----	Not rated		Not rated	
HgA: Harrod-----	Very limited Flooding Depth to bedrock Depth to saturated zone Restricted permeability	1.00 1.00 1.00 1.00	Very limited Depth to bedrock Flooding Depth to saturated zone Seepage	1.00 1.00 1.00 0.53
HpA: Houcktown-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53
HpB: Houcktown-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage Slope	1.00 0.53 0.08
HrA: Houcktown-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
HrB: Houcktown-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage Slope	1.00 0.53 0.32
HsA: Houcktown-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53
HsB: Houcktown-----	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage Slope	1.00 0.53 0.08
HuC2: Houcktown-----	Very limited Restricted permeability Depth to saturated zone Slope	1.00 1.00 0.32	Very limited Depth to saturated zone Slope Seepage	1.00 1.00 0.53
Glynwood-----	Very limited Restricted permeability Depth to saturated zone Slope	1.00 1.00 0.32	Very limited Depth to saturated zone Slope	1.00 1.00
HvA: Hoytville-----	Very limited Restricted permeability Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
KnA: Knoxdale-----	Very limited Flooding Depth to saturated zone Restricted permeability	1.00 0.65 0.46	Very limited Flooding Seepage Depth to saturated zone	1.00 1.00 0.02
LbF, LcD2: Lybrand-----	Very limited Restricted permeability Slope Depth to saturated zone	1.00 1.00 0.97	Very limited Slope Depth to saturated zone	1.00 0.52

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
<b>MbA:</b>				
Medway-----	Very limited		Very limited	
	Flooding	1.00	Flooding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	0.46	Seepage	1.00
	permeability			
<b>MmA:</b>				
Millsdale-----	Very limited		Very limited	
	Depth to bedrock	1.00	Depth to bedrock	1.00
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	1.00		
	permeability			
<b>MnA:</b>				
Milton-----	Very limited		Very limited	
	Depth to bedrock	1.00	Depth to bedrock	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	1.00	Seepage	0.53
	permeability			
<b>NpA:</b>				
Nappanee-----	Very limited		Very limited	
	Restricted	1.00	Depth to	1.00
	permeability		saturated zone	
	Depth to	1.00		
	saturated zone			
<b>PaA:</b>				
Patton-----	Very limited		Very limited	
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	0.72	Seepage	0.53
	permeability			
<b>PmA:</b>				
Pewamo-----	Very limited		Very limited	
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	1.00		
	permeability			
<b>PoA:</b>				
Pewamo-----	Very limited		Very limited	
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	1.00		
	permeability			
Urban land-----	Not rated		Not rated	
<b>Pp, Ps, Pt:</b>				
Pits-----	Not rated		Not rated	

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
RdA, ReA, RgA: Rensselaer-----	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00  0.46	Very limited Ponding Depth to saturated zone Seepage	1.00 1.00  0.53
RoA: Roundhead-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Seepage Depth to saturated zone Content of organic matter	1.00 1.00 1.00 1.00
SbA: Saranac-----	Very limited Ponding Depth to saturated zone Restricted permeability Flooding	1.00 1.00 1.00 0.40	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.40
ScA: Saranac-----	Very limited Flooding Ponding Depth to saturated zone Restricted permeability	1.00 1.00 1.00 1.00	Very limited Ponding Flooding Depth to saturated zone	1.00 1.00 1.00
SdB: Seward-----	Very limited Restricted permeability Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited Seepage Depth to saturated zone Slope	1.00 1.00 0.08
SfB: Shawtown-----	Very limited Depth to saturated zone Filtering capacity Restricted permeability	1.00 1.00 0.46	Very limited Seepage Depth to saturated zone Slope	1.00 1.00 0.32
SgC2: Shinrock-----	Very limited Depth to saturated zone Restricted permeability Slope	1.00 1.00 0.32	Very limited Depth to saturated zone Slope Seepage	1.00 1.00 0.28

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
ShA, SkA: Shoals-----	Very limited Flooding Depth to saturated zone Restricted permeability	1.00 1.00 0.46	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 0.53
SnA: Sleeth-----	Very limited Depth to saturated zone Filtering capacity Restricted permeability	1.00 1.00 0.46	Very limited Depth to saturated zone Seepage	1.00 0.53
SoA, SrA: Sloan-----	Very limited Flooding Ponding Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.72	Very limited Ponding Flooding Depth to saturated zone Seepage	1.00 1.00 1.00 0.28
ThB: Thackery-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.46	Very limited Depth to saturated zone Seepage	1.00 0.53
TkA: Thackery-----	Very limited Depth to saturated zone Filtering capacity Restricted permeability	1.00 1.00 0.46	Very limited Seepage Depth to saturated zone	1.00 1.00
TnA: Tiderishi-----	Very limited Depth to saturated zone Restricted permeability	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.53
UdA, UdD: Udorthents-----	Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated	
W: Water-----	Not rated		Not rated	

Table 20.—Sanitary Facilities, Part I—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
WdA:				
Westland-----	Very limited		Very limited	
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Seepage	1.00
	saturated zone		Depth to	1.00
	Filtering	1.00	saturated zone	
	capacity			
	Restricted	0.46		
	permeability			
WeA:				
Westland-----	Very limited		Very limited	
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Filtering	1.00	Seepage	0.53
	capacity			
	Restricted	0.46		
	permeability			
Rensselaer-----	Very limited		Very limited	
	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone	
	Restricted	0.46	Seepage	0.53
	permeability			

Table 20.—Sanitary Facilities, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Depth to saturated zone Ponding Too clayey	1.00  1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 0.50
ArB: Arkport-----	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Somewhat limited Seepage Too sandy	0.52 0.50
AuA: Aurand-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
AxA: Aurand-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
BoA: Blount-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
BoB: Blount-----	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 1.00
BrA: Blount-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
Jenera-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
BsA: Blount-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
Urban land-----	Not rated		Not rated		Not rated	

Table 20.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CyA: Cygnets-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
DaA: Darroch-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
EmB: Eldean-----	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Seepage Carbonate content Gravel content Too sandy	1.00 1.00 0.67 0.50
FdA: Flatrock-----	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
FnB: Fox-----	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Seepage Too sandy	1.00 0.50
Fnd2: Fox-----	Very limited Seepage Too sandy Slope	1.00 1.00 1.00	Very limited Seepage Slope	1.00 1.00	Very limited Seepage Slope Too sandy Gravel content	1.00 1.00 0.50 0.01
FoA: Fox-----	Very limited Seepage Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Seepage Too sandy	1.00 0.50
FpC2: Fox-----	Very limited Seepage Too sandy Slope	1.00 1.00 0.04	Very limited Seepage Slope	1.00 0.04	Very limited Seepage Too sandy Slope Gravel content	1.00 0.50 0.04 0.01
Lybrand-----	Somewhat limited Too clayey Slope	0.50 0.04	Somewhat limited Slope	0.04	Somewhat limited Too clayey Slope	0.50 0.04
GaA, GaB: Gallman-----	Very limited Seepage	1.00	Very limited Seepage	1.00	Somewhat limited Seepage	0.52

Table 20.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GaC: Gallman-----	Very limited Seepage Slope	1.00 0.04	Very limited Seepage Slope	1.00 0.04	Somewhat limited Seepage Slope	0.52 0.04
GbA: Gallman-----	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 1.00	Somewhat limited Seepage	0.52
GkA, GkB: Glynwood-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
GmC2: Glynwood-----	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04	Very limited Depth to saturated zone Slope	1.00 0.04	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04
GnB: Glynwood-----	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone	1.00 1.00
GnC: Glynwood-----	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04	Very limited Depth to saturated zone Slope	1.00 0.04	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04
GrB2: Glynwood-----	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone	1.00 1.00 1.00
GrC2: Glynwood-----	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04	Very limited Depth to saturated zone Slope	1.00 0.04	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04
GuB: Glynwood-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
Urban land-----	Not rated		Not rated		Not rated	

Table 20.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HgA: Harrod-----	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Depth to saturated zone	1.00 1.00
HpA, HpB: Houcktown-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
HrA: Houcktown-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
HrB, HsA, HsB: Houcktown-----	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
HuC2: Houcktown-----	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04	Very limited Depth to saturated zone Slope	1.00 0.04	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04
Glynwood-----	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04	Very limited Depth to saturated zone Slope	1.00 0.04	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.04
HvA: Hoytville-----	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 1.00
KnA: Knoxdale-----	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Not limited	
LbF, LcD2: Lybrand-----	Very limited Slope Too clayey	1.00 0.50	Very limited Slope	1.00	Very limited Slope Too clayey	1.00 0.50

Table 20.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MbA: Medway-----	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
MmA: Millsdale-----	Very limited Depth to saturated zone Ponding Depth to bedrock Too clayey	1.00 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Depth to bedrock	1.00 1.00 1.00	Very limited Depth to bedrock Ponding Depth to saturated zone Too clayey	1.00 1.00 1.00 1.00
MnA: Milton-----	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Depth to saturated zone	1.00 0.71
NpA: Nappanee-----	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 1.00
PaA: Patton-----	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
PmA: Pewamo-----	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 1.00
PoA: Pewamo-----	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 1.00
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 0.50

Table 20.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RoA: Roundhead-----	Very limited		Very limited		Very limited	
	Depth to	1.00	Ponding	1.00	Ponding	1.00
	saturated zone		Depth to	1.00	Depth to	1.00
	Ponding	1.00	saturated zone		saturated zone	
	Seepage	1.00	Seepage	1.00	Seepage	0.22
SbA: Saranac-----	Very limited		Very limited		Very limited	
	Depth to	1.00	Ponding	1.00	Ponding	1.00
	saturated zone		Depth to	1.00	Depth to	1.00
	Ponding	1.00	saturated zone		saturated zone	
	Too clayey	1.00	Flooding	0.40	Too clayey	1.00
	Flooding	0.40				
ScA: Saranac-----	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Ponding	1.00
	Depth to	1.00	Ponding	1.00	Depth to	1.00
	saturated zone		Depth to	1.00	saturated zone	
	Ponding	1.00	saturated zone		Too clayey	0.50
	Too clayey	0.50				
SdB: Seward-----	Somewhat limited		Very limited		Somewhat limited	
	Depth to	0.96	Seepage	1.00	Depth to	0.71
	saturated zone		Depth to	0.48	saturated zone	
	Too clayey	0.50	saturated zone			
SfB: Shawtown-----	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to	0.68	Depth to	0.04	Depth to	0.25
	saturated zone		saturated zone		saturated zone	
SgC2: Shinrock-----	Very limited		Very limited		Very limited	
	Depth to	1.00	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone		saturated zone	
	Too clayey	0.50	Slope	0.04	Too clayey	0.50
	Slope	0.04			Slope	0.04
ShA: Shoals-----	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Depth to	1.00
	Depth to	1.00	Depth to	1.00	saturated zone	
	saturated zone		saturated zone		Too clayey	0.50
	Seepage	1.00				
	Too clayey	0.50				
SkA: Shoals-----	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Depth to	1.00
	Depth to	1.00	Depth to	1.00	saturated zone	
	saturated zone		saturated zone		Too clayey	0.50
	Too clayey	0.50				

Table 20.—Sanitary Facilities, Part II—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SnA: Sleeth-----	Very limited Depth to saturated zone Seepage Too clayey	1.00 1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
SoA, SrA: Sloan-----	Very limited Flooding Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00 0.50	Very limited Flooding Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 0.50
ThB, TkA: Thackery-----	Very limited Depth to saturated zone Seepage Too clayey	1.00 1.00 0.50	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone Too clayey	0.96 0.50
TnA: Tiderishi-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Very limited Depth to saturated zone Ponding Seepage Too clayey	1.00 1.00 1.00 0.50	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey	1.00 1.00 0.50
WeA: Westland-----	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
Rensselaer-----	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 21.—Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.74	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.60	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.60
ArB: Arkport-----	Somewhat limited Too acid Droughty Filtering capacity	0.08 0.01 0.01	Somewhat limited Too acid Droughty Filtering capacity	0.31 0.01 0.01	Somewhat limited Too acid Too steep for surface application Droughty Filtering capacity	0.31 0.08 0.01 0.01
AuA, AxA: Aurand-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.74	Very limited Depth to saturated zone Restricted permeability	1.00 0.60	Very limited Depth to saturated zone Restricted permeability	1.00 0.60
BoA: Blount-----	Very limited Depth to saturated zone Depth to dense layer Restricted permeability Too acid	1.00 1.00 1.00 0.02	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07
BoB: Blount-----	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.02	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07
BrA: Blount-----	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.02	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BrA: Jenera-----	Very limited Depth to saturated zone Restricted permeability Filtering capacity	1.00 0.41 0.01	Very limited Depth to saturated zone Restricted permeability Filtering capacity	1.00 0.31 0.01	Very limited Depth to saturated zone Restricted permeability Filtering capacity	1.00 0.31 0.01
BsA: Blount-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
CyA: Cygnet-----	Very limited Depth to saturated zone Too acid	1.00 0.02	Very limited Depth to saturated zone Too acid	1.00 0.07	Very limited Depth to saturated zone Too acid	1.00 0.07
DaA: Darroch-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
EmB: Eldean-----	Very limited Filtering capacity Droughty	1.00 0.27	Very limited Filtering capacity Droughty	1.00 0.27	Very limited Filtering capacity Droughty	1.00 0.27
FdA: Flatrock-----	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
FnB: Fox-----	Very limited Filtering capacity Too acid	1.00 0.02	Very limited Filtering capacity Too acid	1.00 0.07	Very limited Filtering capacity Too steep for surface application Too acid	1.00 0.08 0.07
FnD2: Fox-----	Very limited Filtering capacity Slope Droughty Too acid	1.00 1.00 0.06 0.02	Very limited Filtering capacity Slope Too acid Droughty	1.00 1.00 0.07 0.06	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application Too acid Droughty	1.00 1.00 1.00 0.07 0.06

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FoA: Fox-----	Very limited Filtering capacity Too acid	1.00 0.02	Very limited Filtering capacity Too acid	1.00 0.07	Very limited Filtering capacity Too acid	1.00 0.07
FpC2: Fox-----	Very limited Filtering capacity Droughty Slope Too acid	1.00 0.52 0.32 0.02	Very limited Filtering capacity Droughty Slope Too acid	1.00 0.52 0.32 0.07	Very limited Filtering capacity Too steep for surface application Droughty Too steep for sprinkler application Too acid	1.00 1.00 0.52 0.22 0.07
Lybrand-----	Very limited Restricted permeability Slope Too acid	1.00 0.32 0.02	Very limited Restricted permeability Slope Too acid	1.00 0.32 0.07	Very limited Restricted permeability Too steep for surface application Too steep for sprinkler application Too acid	1.00 1.00 0.22 0.07
GaA: Gallman-----	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01
GaB: Gallman-----	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Too steep for surface application Filtering capacity	0.08 0.01
GaC: Gallman-----	Somewhat limited Slope Filtering capacity	0.32 0.01	Somewhat limited Slope Filtering capacity	0.32 0.01	Very limited Too steep for surface application Too steep for sprinkler application Filtering capacity	1.00 0.22 0.01
GbA: Gallman-----	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01	Somewhat limited Filtering capacity	0.01

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GkA, GkB: Glynwood-----	Very limited		Very limited		Very limited	
	Restricted	1.00	Depth to	1.00	Depth to	1.00
	permeability		saturated zone		saturated zone	
	Depth to	1.00	Restricted	1.00	Restricted	1.00
	saturated zone		permeability		permeability	
	Too acid	0.02	Too acid	0.07	Too acid	0.07
GmC2: Glynwood-----	Very limited		Very limited		Very limited	
	Restricted	1.00	Depth to	1.00	Depth to	1.00
	permeability		saturated zone		saturated zone	
	Depth to	1.00	Restricted	1.00	Restricted	1.00
	saturated zone		permeability		permeability	
	Slope	0.32	Slope	0.32	Too steep for	1.00
	Shallow to densic	0.15	Shallow to densic	0.15	surface	
	materials		materials		application	
	Droughty	0.13	Droughty	0.13	Too steep for	0.22
					sprinkler	
					application	
					Droughty	0.13
GnB: Glynwood-----	Very limited		Very limited		Very limited	
	Restricted	1.00	Depth to	1.00	Depth to	1.00
	permeability		saturated zone		saturated zone	
	Depth to	1.00	Restricted	1.00	Restricted	1.00
	saturated zone		permeability		permeability	
	Too acid	0.02	Too acid	0.07	Too steep for	0.08
					surface	
					application	
					Too acid	0.07
GnC: Glynwood-----	Very limited		Very limited		Very limited	
	Restricted	1.00	Depth to	1.00	Depth to	1.00
	permeability		saturated zone		saturated zone	
	Depth to	1.00	Restricted	1.00	Restricted	1.00
	saturated zone		permeability		permeability	
	Slope	0.32	Slope	0.32	Too steep for	1.00
	Too acid	0.02	Too acid	0.07	surface	
					application	
					Too steep for	0.22
					sprinkler	
					application	
					Too acid	0.07
GrB2: Glynwood-----	Very limited		Very limited		Very limited	
	Restricted	1.00	Depth to	1.00	Depth to	1.00
	permeability		saturated zone		saturated zone	
	Depth to	1.00	Restricted	1.00	Restricted	1.00
	saturated zone		permeability		permeability	
	Too acid	0.02	Too acid	0.07	Too steep for	0.08
					surface	
					application	
					Too acid	0.07

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrC2: Glynwood-----	Very limited Depth to dense layer	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
	Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
	Depth to saturated zone	1.00	Slope	0.32	Too steep for surface	1.00
	Slope	0.32	Droughty	0.19	application	
	Droughty	0.19	Shallow to densic materials	0.10	Too steep for sprinkler application	0.22
					Droughty	0.19
GuB: Glynwood-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Depth to bedrock	0.23	Depth to bedrock	0.23	Depth to bedrock	0.23
	Droughty	0.02	Droughty	0.02	Droughty	0.02
HpA, HpB: Houcktown-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
	Restricted permeability	0.74	Restricted permeability	0.60	Restricted permeability	0.60
	Droughty	0.01	Droughty	0.01	Droughty	0.01
	Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
HrA: Houcktown-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
	Restricted permeability	0.74	Restricted permeability	0.60	Restricted permeability	0.60
HrB: Houcktown-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
	Restricted permeability	0.74	Restricted permeability	0.60	Restricted permeability	0.60
					Too steep for surface application	0.08
HsA: Houcktown-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
	Restricted permeability	0.74	Restricted permeability	0.60	Restricted permeability	0.60

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
<b>HsB:</b> Houcktown-----	Very limited		Very limited		Very limited	
	Depth to dense	1.00	Depth to	1.00	Depth to	1.00
	layer		saturated zone		saturated zone	
	Depth to	1.00	Restricted	0.60	Restricted	0.60
	saturated zone		permeability		permeability	
	Restricted	0.74	Droughty	0.03	Droughty	0.03
	permeability					
	Droughty	0.03				
<b>HuC2:</b> Houcktown-----	Very limited		Very limited		Very limited	
	Depth to	1.00	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone		saturated zone	
	Restricted	0.74	Restricted	0.60	Too steep for	1.00
	permeability		permeability		surface	
	Slope	0.32	Slope	0.32	application	
					Restricted	0.60
					permeability	
					Too steep for	0.22
					sprinkler	
					application	
<b>Glynwood-----</b>	Very limited		Very limited		Very limited	
	Restricted	1.00	Depth to	1.00	Depth to	1.00
	permeability		saturated zone		saturated zone	
	Depth to	1.00	Restricted	1.00	Restricted	1.00
	saturated zone		permeability		permeability	
	Slope	0.32	Slope	0.32	Too steep for	1.00
	Shallow to densic	0.15	Shallow to densic	0.15	surface	
	materials		materials		application	
	Droughty	0.10	Droughty	0.10	Too steep for	0.22
					sprinkler	
					application	
					Droughty	0.10
<b>HvA:</b> Hoytville-----	Very limited		Very limited		Very limited	
	Ponding	1.00	Ponding	1.00	Ponding	1.00
	Depth to	1.00	Depth to	1.00	Depth to	1.00
	saturated zone		saturated zone		saturated zone	
	Restricted	1.00	Restricted	1.00	Restricted	1.00
	permeability		permeability		permeability	
<b>KnA:</b> Knoxdale-----	Very limited		Very limited		Somewhat limited	
	Flooding	1.00	Flooding	1.00	Flooding	0.60
<b>LbF, LcD2:</b> Lybrand-----	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Too steep for	1.00
	Restricted	1.00	Restricted	1.00	surface	
	permeability		permeability		application	
	Too acid	0.02	Too acid	0.07	Too steep for	1.00
					sprinkler	
					application	
					Restricted	1.00
					permeability	
					Too acid	0.07

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MbA: Medway-----	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
MmA: Millsdale-----	Very limited Ponding Depth to saturated zone Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.41 0.10 0.01	Very limited Ponding Depth to saturated zone Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.31 0.10 0.01	Very limited Ponding Depth to saturated zone Restricted permeability Depth to bedrock Droughty	1.00 1.00 0.31 0.10 0.01
MnA: Milton-----	Somewhat limited Depth to saturated zone Depth to bedrock Droughty Too acid	0.96 0.65 0.48 0.02	Somewhat limited Depth to saturated zone Depth to bedrock Droughty Too acid	0.96 0.65 0.48 0.07	Somewhat limited Depth to saturated zone Depth to bedrock Droughty Too acid	0.96 0.65 0.48 0.07
NpA: Nappanee-----	Very limited Depth to saturated zone Restricted permeability Runoff limitation Too acid	1.00 1.00 0.40 0.02	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 1.00 0.07
PaA: Patton-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00
PmA: Pewamo-----	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.41	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.31	Very limited Ponding Depth to saturated zone Restricted permeability	1.00 1.00 0.31
PoA: Pewamo-----	Not rated		Not rated		Not rated	
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA: Rensselaer-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ReA: Rensselaer-----	Very limited		Very limited		Very limited	
	Ponding	1.00	Ponding	1.00	Ponding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Restricted permeability	0.74	Restricted permeability	0.60	Restricted permeability	0.60
RgA: Rensselaer-----	Very limited		Very limited		Very limited	
	Ponding	1.00	Ponding	1.00	Ponding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
RoA: Roundhead-----	Very limited		Very limited		Very limited	
	Ponding	1.00	Ponding	1.00	Ponding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Restricted permeability	0.74	Restricted permeability	0.60	Restricted permeability	0.60
	Too acid	0.02	Too acid	0.07	Too acid	0.07
	Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
SbA: Saranac-----	Very limited		Very limited		Very limited	
	Ponding	1.00	Ponding	1.00	Ponding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Restricted permeability	0.75	Restricted permeability	0.61	Restricted permeability	0.61
	Flooding	0.40	Flooding	0.40		
ScA: Saranac-----	Very limited		Very limited		Very limited	
	Ponding	1.00	Ponding	1.00	Ponding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Flooding	1.00	Flooding	1.00	Flooding	1.00
	Restricted permeability	0.75	Restricted permeability	0.61	Restricted permeability	0.61
SdB: Seward-----	Very limited		Very limited		Very limited	
	Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
	Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
	Depth to saturated zone	0.96	Depth to saturated zone	0.96	Depth to saturated zone	0.96
	Too acid	0.02	Too acid	0.07	Too acid	0.07

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SfB: Shawtown-----	Very limited Filtering capacity Depth to saturated zone Too acid	1.00 0.68 0.02	Very limited Filtering capacity Depth to saturated zone Too acid	1.00 0.68 0.07	Very limited Filtering capacity Depth to saturated zone Too steep for surface application Too acid	1.00 0.68 0.08 0.07
SgC2: Shinrock-----	Very limited Depth to saturated zone Restricted permeability Slope	1.00 0.74 0.32	Very limited Depth to saturated zone Restricted permeability Slope	1.00 0.60 0.32	Very limited Depth to saturated zone Too steep for surface application Restricted permeability Too steep for sprinkler application	1.00 1.00 0.60 0.22
ShA: Shoals-----	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
SkA: Shoals-----	Very limited Depth to saturated zone Flooding Restricted permeability	1.00 1.00 0.41	Very limited Depth to saturated zone Flooding Restricted permeability	1.00 1.00 0.31	Very limited Depth to saturated zone Flooding Restricted permeability	1.00 0.60 0.31
SnA: Sleeth-----	Very limited Filtering capacity Depth to saturated zone	1.00 1.00	Very limited Filtering capacity Depth to saturated zone	1.00 1.00	Very limited Filtering capacity Depth to saturated zone	1.00 1.00
SoA: Sloan-----	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding	1.00 1.00 0.60
SrA: Sloan-----	Very limited Ponding Depth to saturated zone Flooding Restricted permeability	1.00 1.00 1.00 0.41	Very limited Ponding Depth to saturated zone Flooding Restricted permeability	1.00 1.00 1.00 0.31	Very limited Ponding Depth to saturated zone Flooding Restricted permeability	1.00 1.00 1.00 0.31

Table 21.—Agricultural Waste Management—Continued

Map symbol and soil name	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ThB: Thackery-----	Very limited Depth to saturated zone Filtering capacity	1.00 0.01	Very limited Depth to saturated zone Filtering capacity	1.00 0.01	Very limited Depth to saturated zone Filtering capacity	1.00 0.01
TkA: Thackery-----	Very limited Filtering capacity Depth to saturated zone	1.00 1.00	Very limited Filtering capacity Depth to saturated zone	1.00 1.00	Very limited Filtering capacity Depth to saturated zone	1.00 1.00
TnA: Tiderishi-----	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 0.74 0.02	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 0.60 0.07	Very limited Depth to saturated zone Restricted permeability Too acid	1.00 0.60 0.07
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 1.00
WeA: Westland-----	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Filtering capacity Ponding Depth to saturated zone	1.00 1.00 1.00
Rensselaer-----	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00	Very limited Ponding Depth to saturated zone	1.00 1.00

Table 22.—Water Management, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Somewhat limited Seepage	0.50	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Very limited Deep to water	1.00
ArB: Arkport-----	Very limited Seepage	1.00	Very limited Seepage Piping	1.00 1.00	Very limited Deep to water	1.00
AuA, AxA: Aurand-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
BoA: Blount-----	Not limited		Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
BoB: Blount-----	Not limited		Very limited Depth to saturated zone Hard to compact Piping	1.00 1.00 0.50	Very limited Deep to water	1.00
BrA: Blount-----	Not limited		Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
Jenera-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
BsA: Blount-----	Not limited		Very limited Depth to saturated zone Hard to compact Piping	1.00 1.00 0.50	Very limited Deep to water	1.00
Urban land-----	Not rated		Not rated		Not rated	

Table 22.—Water Management, Part I—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CyA: Cygnet-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
DaA: Darroch-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
EmB: Eldean-----	Very limited Seepage	1.00	Very limited Seepage Piping	1.00 1.00	Very limited Deep to water	1.00
FdA: Flatrock-----	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping	1.00 1.00	Somewhat limited Cutbanks cave	0.10
FnB: Fox-----	Very limited Seepage	1.00	Very limited Seepage Piping	1.00 1.00	Very limited Deep to water	1.00
FnD2: Fox-----	Very limited Seepage Slope	1.00 0.03	Very limited Seepage Piping	1.00 1.00	Very limited Deep to water	1.00
FoA: Fox-----	Very limited Seepage	1.00	Very limited Seepage Piping	1.00 1.00	Very limited Deep to water	1.00
FpC2: Fox-----	Very limited Seepage	1.00	Very limited Seepage Piping	1.00 1.00	Very limited Deep to water	1.00
Lybrand-----	Not limited		Somewhat limited Piping	0.50	Very limited Deep to water	1.00
GaA, GaB, GaC, GbA: Gallman-----	Very limited Seepage	1.00	Very limited Piping	1.00	Very limited Deep to water	1.00
GkA, GkB: Glynwood-----	Not limited		Very limited Depth to saturated zone Hard to compact Piping	1.00 1.00 0.50	Very limited Deep to water	1.00

Table 22.—Water Management, Part I—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GmC2: Glynwood-----	Not limited		Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
GnB, GnC, GrB2: Glynwood-----	Not limited		Very limited Depth to saturated zone Hard to compact Piping	1.00 1.00 0.50	Very limited Deep to water	1.00
GrC2: Glynwood-----	Not limited		Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
GuB: Glynwood-----	Not limited		Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Somewhat limited Depth to bedrock Seepage	0.78 0.50	Very limited Depth to saturated zone Piping Thin layer	1.00 1.00 0.30	Very limited Depth to bedrock Slow refill Cutbanks cave	1.00 0.28 0.10
HpA, HpB: Houcktown-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
HrA, HrB, HsA: Houcktown-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
HsB: Houcktown-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00
HuC2: Houcktown-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
Glynwood-----	Not limited		Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Deep to water	1.00

Table 22.—Water Management, Part I—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HvA: Hoytville-----	Not limited		Very limited Ponding Depth to saturated zone Hard to compact Piping	1.00 1.00 1.00 0.50	Very limited Deep to water	1.00
KnA: Knoxdale-----	Very limited Seepage	1.00	Very limited Piping	1.00	Somewhat limited Deep to water Cutbanks cave	0.99 0.10
LbF: Lybrand-----	Somewhat limited Slope	0.82	Very limited Hard to compact Piping	1.00 0.50	Very limited Deep to water	1.00
LcD2: Lybrand-----	Somewhat limited Slope	0.04	Very limited Hard to compact Piping	1.00 0.50	Very limited Deep to water	1.00
MbA: Medway-----	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping	1.00 1.00	Somewhat limited Cutbanks cave	0.10
MmA: Millsdale-----	Somewhat limited Depth to bedrock	0.69	Very limited Ponding Depth to saturated zone Hard to compact Piping Thin layer	1.00 1.00 1.00 0.50 0.13	Very limited Depth to bedrock Slow refill Cutbanks cave	1.00 0.28 0.10
MnA: Milton-----	Somewhat limited Depth to bedrock Seepage	0.91 0.50	Very limited Piping Depth to saturated zone Thin layer	1.00 0.96 0.90	Very limited Depth to bedrock Slow refill Cutbanks cave Deep to water	1.00 0.28 0.10 0.02
NpA: Nappanee-----	Not limited		Very limited Depth to saturated zone Hard to compact Piping	1.00 1.00 0.50	Very limited Deep to water	1.00
PaA: Patton-----	Very limited Seepage	1.00	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Very limited Cutbanks cave	1.00

Table 22.—Water Management, Part I—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PmA: Pewamo-----	Not limited		Very limited Ponding Depth to saturated zone Hard to compact Piping	1.00 1.00 1.00 0.50	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
PoA: Pewamo-----	Not limited		Very limited Ponding Depth to saturated zone Hard to compact Piping	1.00 1.00 1.00 0.50	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Somewhat limited Seepage	0.50	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Very limited Cutbanks cave Slow refill	1.00 0.28
RoA: Roundhead-----	Very limited Seepage	1.00	Very limited Ponding Depth to saturated zone Seepage Piping	1.00 1.00 1.00 1.00	Very limited Cutbanks cave	1.00
SbA, ScA: Saranac-----	Not limited		Very limited Ponding Depth to saturated zone Hard to compact Piping	1.00 1.00 1.00 0.50	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
SdB: Seward-----	Very limited Seepage	1.00	Very limited Piping Depth to saturated zone Thin layer	1.00 0.96 0.40	Very limited Deep to water	1.00
SfB: Shawtown-----	Very limited Seepage	1.00	Very limited Piping Depth to saturated zone	1.00 0.68	Very limited Deep to water	1.00

Table 22.—Water Management, Part I—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SgC2: Shinrock-----	Somewhat limited Seepage	0.25	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
ShA: Shoals-----	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping	1.00 1.00	Somewhat limited Cutbanks cave	0.10
SkA: Shoals-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
SnA: Sleeth-----	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Cutbanks cave	1.00
SoA: Sloan-----	Somewhat limited Seepage	0.25	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Very limited Cutbanks cave Slow refill	1.00 0.28
SrA: Sloan-----	Somewhat limited Seepage	0.25	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
ThB, TkA: Thackery-----	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping	1.00 0.50	Very limited Cutbanks cave	1.00
TnA: Tiderishi-----	Somewhat limited Seepage	0.50	Very limited Depth to saturated zone Piping	1.00 1.00	Very limited Deep to water	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	

Table 22.—Water Management, Part I—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WdA: Westland-----	Very limited Seepage	1.00	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Very limited Cutbanks cave	1.00
WeA: Westland-----	Very limited Seepage	1.00	Very limited Ponding Depth to saturated zone Piping	1.00 1.00 0.50	Very limited Cutbanks cave	1.00
Rensselaer-----	Somewhat limited Seepage	0.50	Very limited Ponding Depth to saturated zone Piping Thin layer	1.00 1.00 0.50 0.13	Very limited Cutbanks cave Slow refill	1.00 0.28

Table 22.—Water Management, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AkA, AmA: Alvada-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Frost action	1.00 1.00
ArB: Arkport-----	Very limited Droughty	1.00	Very limited Too sandy	1.00	Very limited Cutbanks cave Depth to saturated zone Slope	1.00 1.00 0.04
AuA, AxA: Aurand-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.40	Very limited Depth to saturated zone Restricted permeability	1.00 0.40	Very limited Frost action Restricted permeability	1.00 0.40
BoA, BoB: Blount-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability	1.00 0.91
BrA: Blount-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability	1.00 0.91
Jenera-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.22	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.22	Very limited Frost action Restricted permeability	1.00 0.22
BsA: Blount-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability	1.00 0.91
Urban land-----	Not rated		Not rated		Not rated	

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CyA: Cygnet-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Frost action	1.00
DaA: Darroch-----	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Frost action	1.00
EmB: Eldean-----	Very limited Water erosion	1.00	Very limited Water erosion Too sandy	1.00 1.00	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00
FdA: Flatrock-----	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Frost action Flooding	1.00 0.50
FnB: Fox-----	Very limited Water erosion	1.00	Very limited Water erosion Too sandy	1.00 1.00	Very limited Cutbanks cave Depth to saturated zone Slope	1.00 1.00 0.04
FnD2: Fox-----	Very limited Slope Water erosion	1.00 1.00	Very limited Water erosion Slope Too sandy	1.00 1.00 1.00	Very limited Slope Cutbanks cave Depth to saturated zone	1.00 1.00 1.00
FoA: Fox-----	Very limited Water erosion	1.00	Very limited Water erosion Too sandy	1.00 1.00	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00
FpC2: Fox-----	Very limited Water erosion Slope Droughty Large stones	1.00 1.00 1.00 0.01	Very limited Water erosion Too sandy Slope Large stones	1.00 1.00 1.00 0.01	Very limited Cutbanks cave Depth to saturated zone Slope	1.00 1.00 0.96
Lybrand-----	Very limited Water erosion Slope Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Slope Restricted permeability	1.00 1.00 0.91	Very limited Depth to saturated zone Slope Restricted permeability	1.00 0.96 0.91

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GaA: Gallman-----	Not limited		Not limited		Very limited Depth to saturated zone	1.00
GaB: Gallman-----	Not limited		Not limited		Very limited Depth to saturated zone Slope	1.00 0.04
GaC: Gallman-----	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Depth to saturated zone Slope	1.00 0.96
GbA: Gallman-----	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Very limited Depth to saturated zone	1.00
GkA, GkB: Glynwood-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability	1.00 0.91
GmC2: Glynwood-----	Very limited Water erosion Slope Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Slope Restricted permeability	1.00 1.00 1.00 0.91	Very limited Frost action Slope Restricted permeability	1.00 0.96 0.91
GnB: Glynwood-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability Slope	1.00 0.91 0.04
GnC: Glynwood-----	Very limited Water erosion Slope Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Slope Restricted permeability	1.00 1.00 1.00 0.91	Very limited Frost action Slope Restricted permeability	1.00 0.96 0.91

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GrB2: Glynwood-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00  0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00  0.91	Very limited Frost action Restricted permeability Slope	1.00 0.91  0.04
GrC2: Glynwood-----	Very limited Water erosion Slope Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Slope Restricted permeability	1.00 1.00 1.00 0.91	Very limited Frost action Slope Restricted permeability	1.00 0.96 0.91
GuB: Glynwood-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability Slope	1.00 0.91 0.04
Urban land-----	Not rated		Not rated		Not rated	
HgA: Harrod-----	Very limited Depth to bedrock Depth to saturated zone Restricted permeability	1.00 1.00 0.55	Very limited Depth to saturated zone Restricted permeability Depth to bedrock	1.00 0.55 0.23	Very limited Flooding Frost action Restricted permeability Depth to rock	1.00 1.00 0.55 0.06
HpA, HpB: Houcktown-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.40	Very limited Depth to saturated zone Restricted permeability	1.00 0.40	Very limited Frost action Restricted permeability	1.00 0.40
HrA: Houcktown-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.40	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.40	Very limited Frost action Restricted permeability	1.00 0.40
HrB: Houcktown-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.40	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.40	Very limited Frost action Restricted permeability Slope	1.00 0.40 0.04

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HsA, HsB: Houcktown-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.40	Very limited Depth to saturated zone Restricted permeability	1.00  0.40	Very limited Frost action Restricted permeability	1.00 0.40
HuC2: Houcktown-----	Very limited Water erosion Slope Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.40	Very limited Water erosion Depth to saturated zone Slope Restricted permeability	1.00 1.00 1.00 0.40	Very limited Frost action Slope Restricted permeability	1.00 0.96 0.40
Glynwood-----	Very limited Water erosion Slope Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Slope Restricted permeability	1.00 1.00 1.00 0.91	Very limited Frost action Slope Restricted permeability	1.00 0.96 0.91
HvA: Hoytville-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.22	Very limited Depth to saturated zone Ponding Restricted permeability	1.00 1.00 0.22	Very limited Ponding Frost action Restricted permeability	1.00 1.00 0.22
KnA: Knoxdale-----	Very limited Water erosion	1.00	Very limited Water erosion	1.00	Very limited Depth to saturated zone Frost action Flooding	1.00 1.00 0.50
LbF, LcD2: Lybrand-----	Very limited Slope Water erosion Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Slope Restricted permeability	1.00 1.00 0.91	Very limited Slope Depth to saturated zone Restricted permeability	1.00 1.00 0.91
MbA: Medway-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Flooding Frost action	1.00 1.00
MmA: Millsdale-----	Very limited Depth to bedrock Depth to saturated zone Restricted permeability	1.00 1.00 0.22	Very limited Depth to saturated zone Ponding Restricted permeability Depth to bedrock	1.00 1.00 0.22 0.10	Very limited Ponding Frost action Restricted permeability Depth to rock	1.00 1.00 0.22 0.02

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MnA: Milton-----	Very limited Depth to bedrock Depth to saturated zone	1.00 0.71	Very limited Depth to saturated zone Depth to bedrock	1.00 0.64	Slightly limited Depth to rock	0.17
NpA: Nappanee-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.91	Very limited Frost action Restricted permeability	1.00 0.91
PaA: Patton-----	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Water erosion Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Ponding Frost action	1.00 1.00
PmA: Pewamo-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.22	Very limited Depth to saturated zone Ponding Restricted permeability	1.00 1.00 0.22	Very limited Ponding Frost action Restricted permeability	1.00 1.00 0.22
PoA: Pewamo-----	Very limited Depth to saturated zone Restricted permeability	1.00 0.22	Very limited Depth to saturated zone Ponding Restricted permeability	1.00 1.00 0.22	Very limited Ponding Frost action Restricted permeability	1.00 1.00 0.22
Urban land-----	Not rated		Not rated		Not rated	
Pp, Ps, Pt: Pits-----	Not rated		Not rated		Not rated	
RdA, ReA, RgA: Rensselaer-----	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Water erosion Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Ponding Frost action	1.00 1.00
RoA: Roundhead-----	Very limited Water erosion Depth to saturated zone Restricted permeability	1.00 1.00 0.40	Very limited Water erosion Depth to saturated zone Ponding Restricted permeability	1.00 1.00 1.00 0.40	Very limited Ponding Subsidence Frost action Restricted permeability	1.00 1.00 1.00 0.40

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SbA: Saranac-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.41	Very limited Depth to saturated zone Ponding Restricted permeability	1.00  1.00 0.41	Very limited Ponding Frost action Restricted permeability	1.00 1.00 0.41
ScA: Saranac-----	Very limited Depth to saturated zone Restricted permeability	1.00  0.41	Very limited Depth to saturated zone Ponding Restricted permeability	1.00  1.00 0.41	Very limited Ponding Flooding Frost action Restricted permeability	1.00 1.00 1.00 0.41 0.41
SdB: Seward-----	Somewhat Limited Depth to saturated zone	0.71	Very limited Depth to saturated zone	1.00	Not limited	
SfB: Shawtown-----	Somewhat Limited Depth to saturated zone	0.25	Very limited Depth to saturated zone	1.00	Slightly limited Slope	0.04
SgC2: Shinrock-----	Very limited Water erosion Slope Depth to saturated zone Restricted permeability	1.00 1.00 1.00 0.40	Very limited Water erosion Depth to saturated zone Slope Restricted permeability	1.00 1.00 1.00 0.40	Very limited Frost action Slope Restricted permeability	1.00 0.96 0.40
ShA, SkA: Shoals-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Flooding Frost action	1.00 1.00
SnA: Sleeth-----	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Frost action	1.00
SoA, SrA: Sloan-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Flooding Frost action	1.00 1.00 1.00
ThB, TkA: Thackery-----	Very limited Water erosion Depth to saturated zone	1.00 0.96	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Frost action	1.00

Table 22.—Water Management, Part II—Continued

Map symbol and soil name	Constructing grassed waterways		Constructing terraces and diversions		Drainage	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TnA: Tiderishi-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Frost action	1.00
UdA, UdD: Udorthents-----	Not rated		Not rated		Not rated	
UrB: Urban land-----	Not rated		Not rated		Not rated	
W: Water-----	Not rated		Not rated		Not rated	
WdA: Westland-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Frost action	1.00 1.00
WeA: Westland-----	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Ponding Frost action	1.00 1.00
Rensselaer-----	Very limited Water erosion Depth to saturated zone	1.00 1.00	Very limited Water erosion Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Ponding Frost action	1.00 1.00

Table 23.--Engineering Index Properties  
(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
AkA: Alvada-----	0-14	Loam	CL, CL-ML	A-6, A-4	0	0	85-100	85-100	70-95	50-75	25-40	5-20
	14-50	Clay loam, loam, sandy clay loam	CL, SC	A-4, A-7, A-6	0	0	85-100	80-100	70-95	35-75	25-45	9-25
	50-80	Loam, clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	90-100	90-100	80-100	50-90	30-45	10-25
AmA: Alvada-----	0-10	Silty clay loam	CL	A-7, A-6	0	0	85-100	80-100	75-100	70-95	35-45	15-25
	10-44	Clay loam, silty clay loam, loam	CL, SC	A-4, A-6, A-7	0	0	85-100	80-100	70-95	35-75	25-45	9-25
	44-80	Clay loam, loam, silty clay loam	CL	A-7, A-6	0-1	0-5	90-100	90-100	80-100	50-90	30-45	10-25
ArB: Arkport-----	0-10	Loamy fine sand	SM, SC	A-4, A-2	0	0	95-100	85-100	65-85	20-45	0-25	NP-10
	10-18	Loamy fine sand	SM, SC	A-4, A-2	0	0	95-100	85-100	70-95	20-45	0-25	NP-10
	18-65	Loamy fine sand, fine sandy loam, fine sand	ML, SM, SC	A-4, A-2	0	0	95-100	85-100	65-95	20-55	0-25	NP-10
	65-80	Fine sand, loamy very fine sand, sand	SM, ML	A-2, A-4	0	0	95-100	85-100	60-95	15-50	0-15	NP-5

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
AuA: Aurand-----	0-10	Loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	95-100	85-100	65-100	45-75	20-40	5-20
	10-27	Clay loam, loam, sandy clay loam	CL, SC, CL-ML	A-2, A-6, A-7	0	0	90-100	80-100	75-95	25-75	25-45	5-25
	27-35	Silty clay loam, gravelly loam, sandy loam	CL, SC, CL-ML	A-2, A-4, A-6	0	0-1	90-100	70-100	60-95	30-85	20-45	5-25
	35-44	Clay loam, silty clay loam, clay	CL	A-7, A-6	0	0-5	95-100	90-100	85-100	55-95	30-50	10-30
	44-80	Clay loam, silty clay loam, clay	CL	A-7, A-6	0	0-5	95-100	90-100	85-100	55-95	30-50	10-30
AxA: Aurand-----	0-12	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	90-100	85-100	65-95	25-40	5-20
	12-27	Loam, sandy clay loam, clay loam	CL, SC, CL-ML	A-6, A-7, A-2	0	0	90-100	80-100	75-95	25-75	25-45	5-25
	27-33	Silty clay loam, gravelly loam, sandy loam	CL, SC, CL-ML	A-6, A-4, A-2	0	0-1	90-100	70-100	60-95	30-85	20-45	5-25
	33-46	Silty clay loam, clay loam, clay	CL	A-7, A-6	0	0-5	95-100	90-100	85-100	55-95	30-50	10-30
	46-80	Silty clay loam, clay loam, clay	CL	A-7, A-6	0	0-5	95-100	90-100	85-100	55-95	30-50	10-30
BoA: Blount-----	0-9	Silt loam	CL	A-6	0	0-5	95-100	90-100	90-100	80-95	30-40	10-20
	9-21	Silty clay loam, silty clay, clay loam	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	70-90	60-90	40-55	20-35
	21-55	Silty clay loam, clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	55-80	Silty clay loam, clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
BoB: Blount-----	0-8	Silt loam	CL	A-6	0	0-5	95-100	90-100	90-100	80-95	30-40	10-20
	8-30	Silty clay loam, silty clay, clay loam	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	70-90	60-90	40-55	20-35
	30-45	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	45-80	Silty clay loam, clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
BrA: Blount-----	0-9	Loam	CL	A-6	0	0-5	95-100	90-100	80-100	50-70	30-40	10-20
	9-26	Clay loam, silty clay loam, silty clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	70-90	60-90	40-55	20-35
	26-52	Clay loam, silty clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	52-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
Jenera-----	0-9	Fine sandy loam	SC, SC-SM	A-4, A-6, A-2	0	0	100	95-100	65-95	30-45	20-30	5-15
	9-31	Sandy clay loam, clay loam, loam	CL, SC, CL-ML	A-6, A-4, A-7	0	0	100	95-100	75-100	40-80	25-45	5-25
	31-44	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6, A-7	0	0	100	100	90-100	70-95	20-45	5-25
	44-80	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	35-45	15-25

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
BsA: Blount-----	0-8	Silt loam	CL	A-6	0	0-5	95-100	90-100	90-100	80-95	30-40	10-20
	8-33	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	70-90	60-90	40-55	20-35
	33-51	Silty clay loam, clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	51-80	Silty clay loam, clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
Urban land.												
CyA: Cygnet-----	0-12	Loam	CL, CL-ML, SC	A-4, A-6	0	0	85-100	75-100	70-100	40-70	20-30	5-15
	12-50	Clay loam, gravelly sandy clay loam, loam	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7, A-2	0	0	80-100	55-100	50-100	20-70	25-45	5-25
	50-80	Silty clay loam, silty clay, clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-95	30-50	10-30
DaA: Darroch-----	0-12	Loam	CL	A-4, A-6	0	0	100	95-100	85-100	55-75	20-35	5-15
	12-57	Clay loam, sandy clay loam, fine sandy loam	CL, SC, CL-ML	A-2, A-4, A-6, A-7	0	0	95-100	95-100	80-95	25-75	25-45	5-25
	57-80	Stratified loam to silt loam	CL, ML, SC, SM	A-4, A-6	0	0	95-100	75-100	55-100	40-90	0-30	NP-15

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
<b>EmB:</b>												
Eldean-----	0-10	Silt loam	CL, CL-ML	A-6, A-4	0	0	85-100	80-100	70-100	55-90	20-35	5-15
	10-22	Clay, clay loam, gravelly clay loam	CL, CH, SC	A-6, A-7	0	0-5	75-100	60-100	55-95	40-80	40-55	20-35
	22-27	Loam, very gravelly clay loam, gravelly sandy loam	CL, GC, SC	A-2, A-4, A-6	0	0-10	55-85	45-85	45-75	20-60	20-40	5-20
	27-80	Very gravelly loamy coarse sand, gravelly loamy sand, extremely gravelly coarse sand	GM, GP-GM, SM, SP-SM, GP, GW	A-2, A-1	0	0-15	30-70	20-55	5-40	0-25	0-15	NP-5
<b>FdA:</b>												
Flatrock-----	0-11	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	90-100	85-100	70-90	25-40	5-20
	11-52	Silt loam, loam, silty clay loam	CL, CL-ML	A-6, A-4, A-7	0	0	100	90-100	85-100	60-90	20-45	5-25
	52-64	Stratified coarse sandy loam to loam	CL, SC, CL-ML	A-4, A-6, A-7	0	0	100	75-100	60-90	30-80	20-45	5-25
	64-66	Unweathered bedrock			---	---	---	---	---	---	---	---
<b>FnB:</b>												
Fox-----	0-11	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	75-95	70-90	40-60	20-30	5-15
	11-33	Clay loam, sandy clay loam, gravelly loam	CL, GC, SC, CL-ML	A-2, A-6, A-7, A-4	0-1	0-5	65-100	55-100	30-100	30-80	25-45	5-25
	33-80	Very gravelly loamy sand, extremely gravelly sand, loamy coarse sand	GP, GP-GM, SP, SP-SM	A-2, A-1	0-3	0-10	40-100	35-100	10-75	2-20	0-15	NP-5

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
FnD2: Fox-----	0-6	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	75-95	70-90	40-60	20-30	5-15
	6-27	Clay loam, sandy clay loam, gravelly loam	CL, GC, SC, CL-ML	A-2, A-4, A-7, A-6	0-1	0-5	65-100	55-100	30-100	30-80	25-45	5-25
	27-80	Gravelly loamy coarse sand, loamy coarse sand, extremely gravelly coarse sand, very gravelly loamy coarse sand	GP, GP-GM, SP, SP-SM	A-1, A-2	0-3	0-10	40-100	35-100	10-75	2-20	0-15	NP-5
FoA: Fox-----	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	85-100	80-100	70-100	55-90	20-35	5-15
	11-30	Gravelly clay loam, sandy clay loam, gravelly loam	CL, GC, SC, CL-ML	A-7, A-4, A-6, A-2	0-1	0-5	65-100	55-100	30-100	30-80	25-45	5-25
	30-33	Clay, clay loam, gravelly clay loam	CL, CH, SC	A-6, A-7	0-1	0-5	75-100	60-100	55-95	40-80	40-55	20-35
	33-80	Very gravelly loamy sand, gravelly loamy coarse sand, coarse sand	GP, GP-GM, SP, SP-SM	A-2, A-1	0-3	0-10	40-100	35-100	10-75	2-20	0-15	NP-5
FpC2: Fox-----	0-3	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	75-95	70-90	40-60	20-30	5-15
	3-20	Clay loam, gravelly loam, sandy clay loam	SC, CL-ML, CL, GC	A-4, A-2, A-7, A-6	0-1	0-5	65-100	55-100	30-100	30-80	25-45	5-25
	20-80	Gravelly loamy sand, very gravelly loamy sand, extremely gravelly sand	GP, GP-GM, SP, SP-SM	A-1, A-2	0-3	0-10	40-100	35-100	10-75	2-20	0-15	NP-5

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
FpC2: Lybrand-----	0-7	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	90-100	85-95	80-90	35-45	15-20
	7-31	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	85-95	65-95	40-60	20-35
	31-56	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	56-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
GaA: Gallman-----	0-8	Loam	CL-ML, CL, SC	A-6, A-4	0	0	90-100	75-100	65-100	40-70	20-35	5-15
	8-65	Sandy clay loam, gravelly clay loam, sandy loam	CL, CL-ML, SC	A-2, A-4, A-6, A-7	0	0	75-100	55-95	40-95	20-70	25-45	5-20
	65-80	Loamy sand, very gravelly sand, gravelly sandy loam	SM, SP-SM, SC	A-1, A-2, A-3	0	0	60-100	45-100	30-75	5-30	0-25	NP-10
GaB: Gallman-----	0-10	Loam	CL-ML, CL, SC	A-4, A-6	0	0	90-100	75-100	65-100	40-70	20-35	5-15
	10-61	Loam, gravelly loam, gravelly sandy loam	CL, CL-ML, SC	A-6, A-2, A-4, A-7	0	0	75-100	55-95	40-95	20-70	25-45	5-20
	61-80	Loamy sand, very gravelly sand, gravelly sandy loam	SM, SP-SM, SC	A-2, A-1, A-3	0	0	60-100	45-95	30-75	5-30	0-25	NP-10
GaC: Gallman-----	0-8	Loam	CL-ML, CL, SC	A-4, A-6	0	0	90-100	75-100	65-100	40-70	20-35	5-15
	8-62	Sandy clay loam, gravelly loam, gravelly sandy loam	CL, CL-ML, SC	A-2, A-4, A-6, A-7	0	0	75-100	55-95	40-95	20-70	25-45	5-20
	62-80	Loamy sand, very gravelly sand, gravelly sandy loam	SM, SP-SM, SC	A-2, A-3, A-1	0	0	60-100	45-95	30-75	5-30	0-25	NP-10

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
GbA: Gallman-----	0-12	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	85-100	65-90	20-40	5-20
	12-53	Loam, gravelly clay loam, very gravelly sandy loam	CL, CL-ML, SC	A-6, A-4, A-2	0	0	75-100	55-95	40-95	20-70	25-40	5-20
	53-80	Very gravelly sandy loam, loamy sand, gravelly sand	SM, SP-SM, SC	A-1, A-2, A-3	0	0	60-100	45-95	30-75	5-30	0-25	NP-10
GkA: Glynwood-----	0-9	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	80-100	50-70	25-40	5-20
	9-29	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	29-41	Clay loam, silty clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	41-80	Clay loam, silty clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
GkB: Glynwood-----	0-9	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	80-100	50-70	25-40	5-20
	9-28	Silty clay loam, clay loam, silty clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	28-44	Clay loam, silty clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	44-80	Clay loam, silty clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
GmC2: Glynwood-----	0-6	Clay loam	CL	A-6, A-7	0	0-2	95-100	85-100	75-100	60-75	35-50	15-30
	6-24	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	24-34	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	34-80	Silty clay loam, clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
GnB: Glynwood-----	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	80-100	60-90	25-40	5-20
	9-37	Silty clay loam, silty clay, clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	37-47	Clay loam, silty clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	47-80	Clay loam, silty clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
GnC: Glynwood-----	0-9	Silt loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	80-100	60-90	25-40	5-20
	9-30	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	30-46	Silty clay loam, clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	46-80	Silty clay loam, clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
GrB2: Glynwood-----	0-7	Silty clay loam	CL	A-6, A-7	0	0-2	95-100	90-100	80-100	75-95	35-50	15-30
	7-31	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	31-40	Clay loam, silty clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	40-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
GrC2: Glynwood-----	0-5	Silty clay loam	CL	A-7, A-6	0	0-2	95-100	90-100	80-100	75-95	35-50	15-30
	5-19	Silty clay loam, silty clay, clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	19-35	Clay loam, silty clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	35-80	Clay loam, silty clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
GuB: Glynwood-----	0-8	Silt loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	80-100	60-90	25-40	5-20
	8-25	Silty clay loam, clay loam, silty clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	25-40	Silty clay loam, clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	40-80	Silty clay loam, clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
Urban land.												

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
HgA: Harrod-----	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	90-100	85-100	70-90	25-40	5-20
	11-31	Sandy clay loam, loam, clay loam	CL, CL-ML, SC	A-7, A-4, A-6	0-3	0-5	95-100	75-100	65-100	40-90	25-45	5-25
	31-33	Unweathered bedrock			---	---	---	---	---	---	---	---
HpA: Houcktown-----	0-15	Sandy loam	SC, SM	A-4, A-2	0	0	90-100	75-100	50-85	25-45	0-25	NP-15
	15-31	Clay loam, sandy clay loam, gravelly loam	CL, SC, CL-ML	A-6, A-7, A-2, A-4	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	31-48	Silty clay loam, clay loam	CL	A-7, A-6	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	48-80	Silty clay loam, clay loam, silt loam	CL	A-7, A-6	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25
HpB: Houcktown-----	0-10	Sandy loam	SC, SM	A-2, A-4	0	0	90-100	75-100	50-85	25-45	0-25	NP-15
	10-30	Clay loam, sandy clay loam, gravelly loam	CL, SC, CL-ML	A-6, A-4, A-7, A-2	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	30-48	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	48-80	Clay loam, silty clay loam, silt loam	CL	A-7, A-6	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
HrA: Houcktown-----	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	65-100	50-70	20-30	5-15
	8-35	Clay loam, loam, sandy clay loam, gravelly loam	CL, SC, CL-ML	A-2, A-7, A-4, A-6	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	35-51	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	51-80	Clay loam, silty clay loam, silt loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25
HrB: Houcktown-----	0-10	Loam	CL, CL-ML	A-6, A-4	0	0	90-100	85-100	65-100	50-70	20-30	5-15
	10-30	Loam, sandy clay loam, clay loam, gravelly loam	CL, SC, CL-ML	A-4, A-2, A-6, A-7	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	30-50	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	50-80	Clay loam, silty clay loam, silt loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25
HsA: Houcktown-----	0-10	Silt loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	85-100	55-90	20-35	5-15
	10-30	Clay loam, sandy clay loam, gravelly loam	CL, SC, CL-ML	A-4, A-6, A-7, A-2	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	30-48	Silty clay loam, clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	48-80	Silty clay loam, clay loam, silt loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
HsB: Houcktown-----	0-8	Silt loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	85-100	55-90	20-35	5-15
	8-23	Clay loam, gravelly loam, sandy clay loam, silty clay loam	CL, SC, CL-ML	A-4, A-6, A-7, A-2	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	23-44	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	44-80	Clay loam, silty clay loam, silt loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25
HuC2: Houcktown-----	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	65-100	50-70	20-30	5-15
	8-30	Clay loam, gravelly loam, sandy clay loam	CL, SC, CL-ML	A-2, A-4, A-6, A-7	0	0-1	95-100	60-100	50-85	25-75	25-45	5-25
	30-50	Silty clay loam, clay loam	CL	A-7, A-6	0	0-5	95-100	90-100	75-95	50-90	30-50	10-30
	50-80	Silty clay loam, clay loam, silt loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	50-90	30-45	10-25
Glynwood-----	0-8	Clay loam	CL	A-7, A-6	0	0-2	95-100	85-100	75-100	60-75	35-50	15-30
	8-24	Silty clay loam, silty clay, clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	75-100	65-95	40-60	20-35
	24-34	Silty clay loam, clay loam, silty clay	CL	A-7, A-6	0-1	0-5	95-100	80-95	65-95	45-90	30-50	10-30
	34-80	Silty clay loam, clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
HvA:												
Hoytville-----	0-9	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	90-100	85-100	75-95	30-50	10-30
	9-43	Silty clay, clay	CH, CL	A-7	0	0-5	95-100	85-100	80-100	75-95	45-60	25-35
	43-58	Clay loam, silty clay loam, clay	CL, CH	A-6, A-7	0	0-5	95-100	85-100	80-100	60-95	40-60	20-35
	58-80	Silty clay loam, clay loam, clay	CL	A-6, A-7	0	0-5	95-100	85-100	80-100	50-95	30-50	10-30
KnA:												
Knoxdale-----	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	85-100	70-90	25-40	5-20
	11-55	Silt loam, loam, silty clay loam	CL, CL-ML	A-4, A-6, A-7	0	0	100	95-100	85-100	55-90	25-45	5-25
	55-80	Stratified sandy loam to loam to silt loam	CL, CL-ML, SC	A-4, A-6	0	0	100	75-100	60-90	35-80	20-40	5-20
LbF:												
Lybrand-----	0-10	Silt loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	85-100	75-100	70-90	25-40	5-20
	10-30	Silty clay loam, clay loam, silty clay	CH, CL	A-7, A-6	0-1	0-5	95-100	85-100	85-95	65-95	40-60	20-35
	30-42	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	42-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
LcD2:												
Lybrand-----	0-4	Silty clay loam	CL	A-7, A-6	0	0-2	95-100	90-100	80-100	70-95	35-50	15-30
	4-38	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7	0-1	0-5	95-100	85-100	85-95	65-95	40-60	20-35
	38-54	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	54-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
<b>MbA:</b>												
Medway-----	0-19	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	90-100	80-100	70-90	25-40	5-20
	19-58	Silt loam, silty clay loam, loam	CL, CL-ML	A-6, A-7, A-4	0	0	95-100	90-100	75-95	50-90	25-45	5-25
	58-80	Stratified silt loam to sandy loam	CL, ML, SC, SM	A-4, A-6, A-2	0	0	90-100	90-100	60-90	25-80	0-40	NP-20
<b>MmA:</b>												
Millsdale-----	0-13	Silty clay loam	CL	A-7, A-6	0	0	90-100	75-100	65-100	60-95	35-45	15-25
	13-35	Silty clay, silty clay loam, clay loam	CL, CH	A-6, A-7	0	0-5	85-100	75-100	65-100	55-95	40-55	20-35
	35-37	Unweathered bedrock			---	---	---	---	---	---	---	---
<b>MnA:</b>												
Milton-----	0-10	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-95	55-75	20-35	5-15
	10-23	Loam, clay loam, sandy clay loam	CL, SC, CL-ML	A-7, A-4, A-6	0	0	90-100	85-100	70-85	40-75	25-45	5-25
	23-28	Clay, silty clay, clay loam	CL	A-6, A-7	0	0	85-100	75-100	60-90	50-85	40-50	20-30
	28-30	Unweathered bedrock			---	---	---	---	---	---	---	---
<b>NpA:</b>												
Nappanee-----	0-9	Clay loam	CL	A-7, A-6	0	0-5	95-100	90-100	85-100	60-75	35-45	15-25
	9-37	Silty clay, clay	CH, CL	A-7	0	0-5	95-100	85-100	85-100	80-95	45-70	25-40
	37-52	Clay loam, silty clay loam, silty clay	CL	A-7, A-6	0	0-5	95-100	85-100	85-100	70-95	30-50	10-30
	52-80	Clay loam, silty clay loam, silty clay	CL	A-6, A-7	0-1	0-5	95-100	85-100	80-100	50-95	30-50	10-30

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
PaA:												
Patton-----	0-10	Silty clay loam	CL	A-6, A-7	0	0	100	90-100	85-100	80-95	35-45	15-25
	10-27	Silty clay loam, silty clay	CL	A-7, A-6	0	0	100	90-100	85-100	80-100	35-45	15-25
	27-60	Stratified silt loam to silty clay loam	CL	A-7, A-6	0	0	100	90-100	85-100	75-95	30-45	10-25
	60-80	Stratified fine sandy loam to sandy loam to gravelly sandy loam	CL, CL-ML, SC	A-6, A-4, A-2	0	0	80-100	50-90	40-80	15-50	20-40	5-20
PmA:												
Pewamo-----	0-11	Silty clay loam	CL	A-6, A-7	0	0-5	90-100	85-100	75-100	70-95	35-50	15-30
	11-53	Clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0-5	95-100	85-100	75-100	60-95	40-60	20-35
	53-80	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	75-100	75-100	45-90	30-50	10-30
PoA:												
Pewamo-----	0-12	Silty clay loam	CL	A-6, A-7	0	0-5	90-100	85-100	75-100	70-95	30-50	10-30
	12-52	Silty clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0-5	95-100	85-100	75-100	60-95	40-60	20-35
	52-80	Silty clay loam, clay loam	CL	A-6, A-7	0	0-5	95-100	75-100	75-100	45-90	30-50	10-30
Urban land.												
Pp, Ps, Pt. Pits												

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
<b>RdA:</b>												
Rensselaer-----	0-12	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	80-100	50-70	20-40	5-20
	12-38	Clay loam, loam, silty clay loam	CL	A-7, A-6	0	0	95-100	90-100	80-100	50-90	30-45	10-25
	38-53	Sandy clay loam, sandy loam, loam	CL, SC	A-6, A-4, A-7	0	0	95-100	85-100	70-100	35-75	25-45	5-25
	53-80	Stratified sand to silt loam	CL-ML, ML, SC, SM, CL	A-2, A-6, A-4	0	0	95-100	85-100	70-85	10-80	0-30	NP-15
<b>ReA:</b>												
Rensselaer-----	0-13	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	80-100	50-70	20-40	5-20
	13-38	Clay loam, loam, sandy clay loam	CL	A-7, A-6	0	0	95-100	90-100	80-100	50-90	30-45	10-25
	38-55	Sandy clay loam, loam, sandy loam	CL, SC	A-4, A-7, A-6	0	0	95-100	90-100	70-100	35-75	25-45	5-25
	55-71	Stratified loamy sand to silt loam	CL-ML, ML, SC, SM, CL	A-2, A-4, A-6	0	0	95-100	85-100	70-85	10-80	0-30	NP-15
	71-80	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	90-100	90-100	80-100	50-95	30-50	10-30
<b>RgA:</b>												
Rensselaer-----	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	90-100	70-100	70-85	25-40	5-20
	10-43	Clay loam, silty clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	80-100	50-90	30-45	10-25
	43-49	Loam, fine sandy loam, sandy clay loam	CL, SC	A-4, A-7, A-6	0	0	95-100	85-100	70-100	35-75	25-45	5-25
	49-80	Stratified sand to silt loam	CL-ML, ML, SC, SM, CL	A-2, A-4, A-6	0	0	95-100	85-100	70-85	10-80	0-30	NP-15

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
	<u>In</u>										<u>Pct</u>	
RoA: Roundhead-----	0-12	Muck	PT	A-8	---	---	---	---	---	---	---	---
	12-23	Silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	90-100	85-100	70-95	40-55	20-35
	23-43	Stratified gravelly sandy loam to loam	CL, ML, SC, SM	A-4, A-6, A-2	0	0	80-100	70-100	45-90	25-65	0-30	NP-15
	43-80	Stratified sandy loam to loamy fine sand	CL, ML, SC, SM	A-4, A-6, A-2	0	0	95-100	90-100	70-90	20-50	0-30	NP-15
SbA: Saranac-----	0-11	Silty clay loam	CL	A-7, A-6	0	0	95-100	90-100	90-100	70-95	35-45	15-25
	11-64	Silty clay, clay loam, silty clay loam	CH, CL	A-7, A-6	0	0	95-100	90-100	85-100	70-95	40-60	20-35
	64-80	Stratified silt loam to silty clay loam	CL	A-6, A-7	0	0	95-100	90-100	85-100	70-95	30-45	10-25
ScA: Saranac-----	0-12	Silty clay loam	CL	A-6, A-7	0	0	95-100	90-100	90-100	70-95	35-45	15-25
	12-51	Silty clay loam, silty clay, clay loam	CH, CL	A-7, A-6	0	0	95-100	90-100	85-100	70-95	40-60	20-35
	51-80	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	90-100	85-100	75-100	50-90	30-50	10-30

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
<b>SdB:</b>												
Seward-----	0-10	Loamy fine sand	SC, SM	A-2, A-1	0	0	100	95-100	45-80	15-30	0-25	NP-10
	10-27	Loamy fine sand, loamy sand	SC, SM	A-1, A-2	0	0	100	95-100	45-80	20-30	0-25	NP-10
	27-45	Loam, silty clay loam, sandy clay loam	CL, SC, CL-ML	A-6, A-4	0	0	100	95-100	85-100	40-85	20-40	5-20
	45-64	Clay loam, silty clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
	64-80	Clay loam, silty clay loam	CL	A-7, A-6	0-1	0-5	95-100	75-95	65-95	45-90	30-50	10-30
<b>SfB:</b>												
Shawtown-----	0-9	Loam	CL, CL-ML, SC	A-6, A-4	0	0	85-100	75-100	70-90	40-75	20-40	5-20
	9-55	Loam, clay loam, gravelly loam	CL, SC, CL-ML	A-6, A-1, A-2, A-4, A-7	0	0-1	80-100	60-95	35-80	15-60	25-45	5-25
	55-63	Gravelly loamy coarse sand, loamy sand, very gravelly sandy loam	SC, SM, SP-SM	A-1, A-2	0	0-1	80-100	40-95	25-80	10-35	0-25	NP-10
	63-80	Clay loam, silty clay loam, silt loam	CL	A-6, A-7	0	0-5	95-100	90-100	75-95	45-95	30-50	10-30
<b>SgC2:</b>												
Shinrock-----	0-4	Clay loam	CL	A-6, A-7	0	0	95-100	90-100	75-100	60-80	30-50	10-30
	4-29	Silty clay, clay loam, silty clay loam	CH, CL	A-7, A-6	0	0	95-100	90-100	75-100	65-90	40-60	20-35
	29-80	Silty clay loam, silt loam	CL, ML, CL-ML	A-4, A-6, A-7	0	0	95-100	90-100	90-100	75-95	0-50	NP-30

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ShA: Shoals-----	0-12	Silt loam	CL, CL-ML	A-6, A-4	0	0	100	95-100	90-100	65-90	25-40	5-20
	12-63	Clay loam, silty clay loam, loam	CL, CL-ML	A-4, A-7, A-6	0	0	100	95-100	90-100	55-95	25-45	5-25
	63-80	Stratified sandy loam to silt loam	CL-ML, ML, SM, CL, SC	A-6, A-2, A-4	0	0-3	90-100	75-100	50-100	25-75	0-35	NP-15
SkA: Shoals-----	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	65-90	25-40	5-20
	8-62	Silty clay loam, clay loam, loam	CL, CL-ML	A-7, A-4, A-6	0	0	100	95-100	90-100	55-95	25-45	5-25
	62-80	Clay loam, silty clay loam	CL	A-7, A-6	0	0-5	90-100	85-100	75-100	50-90	30-50	10-30
SnA: Sleeth-----	0-11	Silt loam	CL, CL-ML	A-6, A-4	0	0	95-100	85-100	70-100	55-90	20-30	5-15
	11-46	Clay loam, loam, sandy clay loam	CL, SC	A-6, A-7	0	0	95-100	85-100	80-95	35-75	30-45	10-25
	46-59	Sandy loam, sandy clay loam, loam	CL, SC, CL-ML	A-6, A-2, A-4	0	0	95-100	85-100	60-85	30-75	20-40	5-20
	59-80	Loamy sand, gravelly loamy sand, gravelly loamy coarse sand	SM, SP-SM	A-1, A-2	0	0-1	80-100	55-75	25-65	5-15	0-25	NP-5
SoA: Sloan-----	0-11	Silty clay loam	CL	A-7, A-6	0	0	100	90-100	90-100	80-95	35-45	15-25
	11-58	Silty clay loam, clay loam, silt loam	CL, ML	A-7, A-4, A-6	0	0	100	90-100	85-100	50-95	30-45	5-25
	58-80	Stratified loam to silty clay loam to gravelly sandy loam	CL, SC	A-4, A-6, A-2	0	0	85-100	70-100	45-95	30-90	20-40	5-20

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
SrA: Sloan-----	0-14	Silty clay loam	CL	A-6, A-7	0	0	100	90-100	90-100	80-95	35-45	15-25
	14-58	Clay loam, silty clay loam, loam	CL	A-7, A-6	0	0	100	90-100	85-100	50-95	30-45	10-25
	58-62	Fine sandy loam, silty clay loam, gravelly sandy loam	CL, SC	A-2, A-6, A-4	0	0	85-100	70-100	45-95	30-90	20-40	5-20
	62-80	Clay loam, silty clay loam	CL	A-6, A-7	0	0-5	90-100	85-100	75-100	50-90	30-50	10-30
ThB: Thackery-----	0-17	Sandy loam	SM, SC	A-4, A-2	0	0	95-100	90-100	55-85	25-45	0-25	NP-10
	17-58	Clay loam, sandy clay loam, loam	CL, SC	A-6, A-7	0	0	95-100	85-100	80-95	35-75	30-45	10-25
	58-65	Clay loam, sandy clay loam, loam	CL, SC	A-6, A-7	0	0	95-100	85-100	80-95	35-75	30-45	10-25
	65-80	Loamy sand, loamy coarse sand	SM, SP-SM	A-2	0	0	95-100	80-100	55-85	10-25	0-25	NP-5
TkA: Thackery-----	0-7	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	80-95	50-75	20-40	5-20
	7-57	Clay loam, sandy clay loam, loam	CL, SC	A-7, A-6	0	0	95-100	85-100	80-95	35-75	30-45	10-25
	57-80	Loamy sand, loamy coarse sand	SM, SP-SM	A-2	0	0	95-100	80-100	55-85	10-25	0-25	NP-5
TnA: Tiderishi-----	0-11	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	75-95	55-75	20-35	5-15
	11-42	Loam, clay loam, sandy clay loam	CL, SC, CL-ML	A-7, A-6, A-4	0	0	90-100	85-100	70-85	35-75	25-45	5-25
	42-57	Silt loam, fine sandy loam, silty clay loam	CL, CL-ML, SC	A-4, A-6, A-7	0	0	90-100	85-100	60-90	35-85	20-45	5-25
	57-80	Clay loam, loam, silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	85-100	50-90	30-45	10-25

Table 23.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
UdA, UdD. Udorthents												
UrB. Urban land												
W. Water												
WdA: Westland-----	0-12	Clay loam	CL	A-6, A-7	0	0	90-100	90-100	75-100	55-90	35-45	15-25
	12-47	Clay loam, loam, silty clay loam, sandy clay loam	CL, SC	A-7, A-6	0	0-5	80-100	75-95	65-90	45-70	30-45	10-25
	47-54	Loam, gravelly sandy loam, sandy clay loam	CL, ML, SC, SM	A-4, A-2, A-6	0	0-5	55-100	50-95	25-85	15-70	0-40	NP-20
	54-80	Stratified gravelly loamy coarse sand to very gravelly coarse sand	GP, GP-GM, SP, SP-SM	A-1	0	0-12	40-75	35-75	10-45	0-10	0-25	NP-5

Table 23.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
WeA: Westland-----	0-10	Loam	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	75-100	55-75	20-40	5-20
	10-52	Clay loam, loam, silty clay loam, sandy clay loam	CL, SC	A-6, A-7	0	0-5	80-100	75-95	65-90	45-70	30-45	10-25
	52-59	Clay loam, loam, gravelly sandy loam	CL, ML, SC, SM	A-6, A-4, A-2	0	0-5	55-100	50-95	25-85	15-70	0-40	NP-20
	59-80	Stratified gravelly loamy coarse sand to very gravelly coarse sand	GP, GP-GM, SP, SP-SM	A-1	0	0-12	40-75	35-75	10-45	0-10	0-25	NP-5
Rensselaer-----	0-19	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	80-100	50-70	25-40	5-20
	19-38	Loam, clay loam, silty clay loam	CL	A-6, A-7	0	0	95-100	90-100	80-100	50-90	30-45	10-25
	38-58	Fine sandy loam, loam, sandy clay loam	CL, SC	A-6, A-4	0	0	95-100	85-100	70-100	35-75	25-45	5-25
	58-80	Stratified sand to silt loam	CL-ML, ML, SC, SM	A-2, A-4, A-6	0	0	95-100	85-100	70-85	10-80	0-30	NP-15

Table 24.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
							Kw	Kf	T	
	In	Pct	g/cc	In/hr	In/in					
<b>AkA:</b>										
Alvada-----	0-14	18-27	1.30-1.45	0.60-2.00	0.18-0.22	Low	.24	.28	5	6
	14-50	20-35	1.35-1.60	0.60-2.00	0.12-0.16	Low	.24	.28		
	50-80	22-35	1.60-1.80	0.06-0.60	0.05-0.10	Moderate	.32	.32		
<b>AmA:</b>										
Alvada-----	0-10	27-35	1.35-1.55	0.60-2.00	0.19-0.23	Moderate	.28	.32	5	7
	10-44	20-35	1.35-1.60	0.60-2.00	0.12-0.16	Low	.24	.28		
	44-80	22-35	1.60-1.80	0.06-0.60	0.05-0.10	Moderate	.32	.32		
<b>ArB:</b>										
Arkport-----	0-10	5-15	1.10-1.40	2.00-6.00	0.09-0.12	Low	.17	.17	5	2
	10-18	3-15	1.25-1.55	2.00-6.00	0.06-0.16	Low	.28	.28		
	18-65	1-15	1.25-1.55	2.00-6.00	0.06-0.12	Low	.28	.28		
	65-80	1-5	1.25-1.55	2.00-6.00	0.02-0.06	Low	.28	.28		
<b>AuA:</b>										
Aurand-----	0-10	12-27	1.30-1.45	0.60-2.00	0.18-0.22	Low	.28	.28	4	5
	10-27	18-35	1.30-1.70	0.60-2.00	0.12-0.16	Low	.24	.28		
	27-35	15-35	1.30-1.70	0.60-2.00	0.10-0.16	Low	.28	.32		
	35-44	27-42	1.40-1.80	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	44-80	27-42	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>AxA:</b>										
Aurand-----	0-12	18-27	1.20-1.45	0.60-2.00	0.20-0.24	Low	.28	.28	4	6
	12-27	18-35	1.30-1.70	0.60-2.00	0.12-0.16	Low	.24	.28		
	27-33	15-35	1.30-1.70	0.60-2.00	0.10-0.16	Low	.28	.32		
	33-46	27-42	1.40-1.80	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	46-80	27-42	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>BoA:</b>										
Blount-----	0-9	22-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.32	.37	4	6
	9-21	35-48	1.40-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	21-55	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	55-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>BoB:</b>										
Blount-----	0-8	22-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.32	.37	4	6
	8-30	35-48	1.40-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	30-45	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	45-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>BrA:</b>										
Blount-----	0-9	22-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.32	.37	4	6
	9-26	35-48	1.40-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	26-52	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	52-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>Jenera-----</b>	0-9	10-20	1.30-1.65	2.00-6.00	0.13-0.22	Low	.20	.20	5	3
	9-31	18-35	1.40-1.60	0.60-2.00	0.15-0.19	Low	.32	.32		
	31-44	15-35	1.50-1.70	0.20-0.60	0.09-0.12	Low	.37	.37		
	44-80	27-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Kw	Kf	T	
BsA:										
Blount-----	0-8	22-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.32	.37	4	6
	8-33	35-48	1.40-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	33-51	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	51-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
Urban land.										
CyA:										
Cygnet-----	0-12	12-20	1.30-1.50	0.60-2.00	0.16-0.22	Low	.24	.28	4	5
	12-50	18-35	1.25-1.60	0.60-2.00	0.14-0.18	Low	.28	.32		
	50-80	27-42	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
DaA:										
Darroch-----	0-12	12-26	1.30-1.60	0.60-2.00	0.18-0.24	Low	.28	.28	5	5
	12-57	18-35	1.50-1.70	0.60-2.00	0.09-0.20	Low	.37	.37		
	57-80	5-20	1.50-1.70	0.60-2.00	0.19-0.21	Low	.49	.55		
EmB:										
Eldean-----	0-10	15-25	1.30-1.50	0.60-2.00	0.18-0.22	Low	.37	.43	4	5
	10-22	35-48	1.40-1.60	0.20-2.00	0.08-0.14	Moderate	.37	.49		
	22-27	15-30	1.30-1.60	0.60-2.00	0.07-0.14	Low	.37	.64		
	27-80	2-8	1.55-1.70	6.00-99.90	0.01-0.04	Low	.10	.43		
FdA:										
Flatrock-----	0-11	18-27	1.20-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	5	6
	11-52	18-35	1.25-1.60	0.60-2.00	0.17-0.22	Low	.32	.32		
	52-64	15-35	1.20-1.60	0.60-6.00	0.12-0.18	Low	.28	.32		
	64-66	---	---	0.00-0.60	---	---	---	---		
FnB:										
Fox-----	0-11	10-17	1.35-1.55	0.60-2.00	0.17-0.24	Low	.37	.37	4	5
	11-33	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	33-80	0-5	1.30-1.70	6.00-99.90	0.02-0.04	Low	.10	.24		
FnD2:										
Fox-----	0-6	10-17	1.35-1.55	0.60-2.00	0.17-0.24	Low	.37	.37	4	5
	6-27	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	27-80	0-5	1.30-1.70	6.00-99.90	0.02-0.04	Low	.10	.24		
FoA:										
Fox-----	0-11	15-25	1.30-1.50	0.60-2.00	0.18-0.22	Low	.37	.37	4	5
	11-30	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	30-33	35-48	1.40-1.60	0.20-2.00	0.08-0.14	Moderate	.37	.49		
	33-80	0-5	1.30-1.70	6.00-99.90	0.02-0.04	Low	.10	.24		
FpC2:										
Fox-----	0-3	10-17	1.35-1.55	0.60-2.00	0.17-0.24	Low	.37	.37	4	5
	3-20	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	20-80	0-5	1.30-1.70	6.00-99.90	0.02-0.04	Low	.10	.24		
Lybrand-----	0-7	27-38	1.35-1.55	0.20-0.60	0.17-0.23	Moderate	.37	.43	4	7
	7-31	35-50	1.55-1.75	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	31-56	27-40	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	56-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
							Kw	Kf	T	
	In	Pct	g/cc	In/hr	In/in					
GaA:										
Gallman-----	0-8	10-25	1.30-1.45	0.60-2.00	0.14-0.20	Low	.32	.37	5	5
	8-65	18-30	1.45-1.65	2.00-6.00	0.10-0.16	Low	.24	.32		
	65-80	3-15	1.25-1.55	2.00-20.00	0.06-0.10	Low	.17	.24		
GaB:										
Gallman-----	0-10	10-25	1.30-1.45	0.60-2.00	0.14-0.20	Low	.32	.37	5	5
	10-61	18-30	1.45-1.65	2.00-6.00	0.10-0.16	Low	.24	.32		
	61-80	3-15	1.25-1.55	2.00-20.00	0.06-0.10	Low	.17	.24		
GaC:										
Gallman-----	0-8	10-25	1.30-1.45	0.60-2.00	0.14-0.20	Low	.32	.37	5	5
	8-62	18-30	1.45-1.65	2.00-6.00	0.10-0.16	Low	.24	.32		
	62-80	3-15	1.25-1.55	2.00-20.00	0.06-0.10	Low	.17	.24		
GbA:										
Gallman-----	0-12	18-27	1.30-1.50	0.60-2.00	0.18-0.22	Low	.32	.37	5	6
	12-53	18-30	1.45-1.65	2.00-6.00	0.10-0.16	Low	.24	.32		
	53-80	3-15	1.25-1.55	2.00-20.00	0.06-0.10	Low	.17	.24		
GkA:										
Glynwood-----	0-9	16-27	1.25-1.50	0.60-2.00	0.20-0.24	Low	.43	.43	4	6
	9-29	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	29-41	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	41-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
GkB:										
Glynwood-----	0-9	16-27	1.25-1.50	0.60-2.00	0.20-0.24	Low	.43	.43	4	6
	9-28	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	28-44	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	44-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
GmC2:										
Glynwood-----	0-6	27-38	1.40-1.60	0.20-0.60	0.17-0.23	Moderate	.43	.49	4	6
	6-24	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	24-34	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	34-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
GnB:										
Glynwood-----	0-9	16-27	1.25-1.50	0.60-2.00	0.20-0.24	Low	.43	.43	4	6
	9-37	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	37-47	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	47-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
GnC:										
Glynwood-----	0-9	16-27	1.25-1.50	0.60-2.00	0.20-0.24	Low	.43	.43	4	6
	9-30	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	30-46	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	46-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
GrB2:										
Glynwood-----	0-7	27-38	1.35-1.55	0.20-0.60	0.17-0.23	Moderate	.43	.49	4	7
	7-31	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	31-40	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	40-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Kw	Kf	T	
GrC2: Glynwood-----	0-5	27-38	1.35-1.55	0.20-0.60	0.17-0.23	Moderate	.43	.49	4	7
	5-19	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	19-35	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	35-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
GuB: Glynwood-----	0-8	16-27	1.25-1.50	0.60-2.00	0.20-0.24	Low	.43	.43	4	6
	8-25	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	25-40	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	40-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
Urban land.										
HgA: Harrod-----	0-11	18-27	1.20-1.45	0.60-2.00	0.20-0.24	Low	.28	.28	2	6
	11-31	18-32	1.20-1.50	0.60-2.00	0.14-0.18	Low	.24	.28		
	31-33	---	---	0.00-0.60	---	---	---	---		
HpA: Houcktown-----	0-15	9-18	1.30-1.45	2.00-6.00	0.12-0.18	Low	.24	.24	4	3
	15-31	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	31-48	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	48-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
HpB: Houcktown-----	0-10	9-18	1.30-1.45	2.00-6.00	0.12-0.18	Low	.24	.24	4	3
	10-30	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	30-48	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	48-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
HrA: Houcktown-----	0-8	12-20	1.35-1.50	0.60-2.00	0.18-0.22	Low	.37	.37	4	5
	8-35	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	35-51	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	51-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
HrB: Houcktown-----	0-10	12-20	1.35-1.50	0.60-2.00	0.18-0.22	Low	.37	.37	4	5
	10-30	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	30-50	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	50-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
HsA: Houcktown-----	0-10	10-25	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	5
	10-30	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	30-48	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	48-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
HsB: Houcktown-----	0-8	10-25	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	5
	8-23	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	23-44	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	44-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
							Kw	Kf	T	
	In	Pct	g/cc	In/hr	In/in					
<b>HuC2:</b>										
Houcktown-----	0-8	12-20	1.35-1.50	0.60-2.00	0.18-0.22	Low	.37	.37	4	5
	8-30	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.37		
	30-50	27-37	1.70-1.90	0.06-0.60	0.06-0.10	Moderate	.32	.37		
	50-80	23-35	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>Glynwood-----</b>										
	0-8	27-38	1.40-1.60	0.20-0.60	0.17-0.23	Moderate	.43	.49	4	6
	8-24	35-55	1.45-1.70	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	24-34	27-42	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	34-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>HvA:</b>										
Hoytville-----	0-9	27-40	1.25-1.50	0.20-2.00	0.19-0.23	Moderate	.28	.28	5	7
	9-43	40-55	1.35-1.60	0.20-0.60	0.08-0.13	Moderate	.28	.32		
	43-58	35-50	1.40-1.75	0.06-0.20	0.05-0.10	Moderate	.32	.37		
	58-80	27-42	1.70-1.90	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>KnA:</b>										
Knoxdale-----	0-11	18-27	1.20-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	5	6
	11-55	18-35	1.25-1.60	0.60-2.00	0.17-0.22	Low	.37	.37		
	55-80	15-27	1.20-1.60	0.60-6.00	0.12-0.18	Low	.28	.32		
<b>LbF:</b>										
Lybrand-----	0-10	18-27	1.25-1.50	0.60-2.00	0.20-0.24	Low	.37	.43	4	6
	10-30	35-50	1.55-1.75	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	30-42	27-40	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	42-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>LcD2:</b>										
Lybrand-----	0-4	27-38	1.35-1.55	0.20-0.60	0.17-0.23	Moderate	.37	.43	4	7
	4-38	35-50	1.55-1.75	0.06-0.20	0.12-0.19	Moderate	.32	.37		
	38-54	27-40	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	54-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>MbA:</b>										
Medway-----	0-19	18-27	1.20-1.45	0.60-2.00	0.20-0.24	Low	.28	.28	5	6
	19-58	18-32	1.20-1.50	0.60-2.00	0.14-0.18	Low	.32	.37		
	58-80	5-27	1.20-1.60	0.60-6.00	0.11-0.15	Low	.28	.32		
<b>MmA:</b>										
Millsdale-----	0-13	27-35	1.30-1.50	0.60-2.00	0.17-0.22	Moderate	.28	.32	2	7
	13-35	35-45	1.40-1.65	0.20-0.60	0.12-0.16	Moderate	.28	.32		
	35-37	---	---	0.00-0.60	---	---	---	---		
<b>MnA:</b>										
Milton-----	0-10	15-25	1.30-1.45	0.60-2.00	0.18-0.22	Low	.37	.37	2	6
	10-23	18-35	1.30-1.70	0.60-2.00	0.12-0.16	Low	.28	.32		
	23-28	35-42	1.45-1.70	0.60-2.00	0.10-0.16	Moderate	.28	.32		
	28-30	---	---	0.00-0.60	---	---	---	---		
<b>NpA:</b>										
Nappanee-----	0-9	27-35	1.30-1.55	0.20-0.60	0.18-0.22	Moderate	.37	.37	4	6
	9-37	45-60	1.40-1.65	0.06-0.20	0.08-0.14	Moderate	.37	.37		
	37-52	27-42	1.60-1.90	0.06-0.20	0.06-0.12	Moderate	.32	.37		
	52-80	27-42	1.70-1.90	0.01-0.20	0.01-0.05	Moderate	.32	.37		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
							Kw	Kf	T	
	In	Pct	g/cc	In/hr	In/in					
PaA:										
Patton-----	0-10	27-35	1.15-1.35	0.60-2.00	0.21-0.23	Moderate	.28	.28	5	7
	10-27	27-45	1.25-1.45	0.20-2.00	0.18-0.20	Moderate	.43	.43		
	27-60	22-35	1.30-1.50	0.60-2.00	0.18-0.22	Low	.43	.43		
	60-80	15-27	1.30-1.50	2.00-6.00	0.08-0.14	Low	.32	.43		
PmA:										
Pewamo-----	0-11	27-40	1.35-1.55	0.60-2.00	0.20-0.23	Moderate	.28	.28	5	7
	11-53	35-50	1.40-1.70	0.20-0.60	0.12-0.20	Moderate	.32	.32		
	53-80	27-40	1.50-1.70	0.20-0.60	0.14-0.18	Moderate	.37	.37		
PoA:										
Pewamo-----	0-12	27-40	1.35-1.55	0.60-2.00	0.20-0.23	Moderate	.28	.28	5	7
	12-52	35-50	1.40-1.70	0.20-0.60	0.12-0.20	Moderate	.32	.32		
	52-80	27-40	1.50-1.70	0.20-0.60	0.14-0.18	Moderate	.37	.37		
Urban land.										
Pp, Ps, Pt. Pits										
RdA:										
Rensselaer-----	0-12	15-27	1.30-1.45	0.60-2.00	0.22-0.24	Low	.24	.24	5	6
	12-38	20-35	1.30-1.60	0.60-2.00	0.17-0.22	Low	.37	.37		
	38-53	18-35	1.40-1.60	0.60-2.00	0.15-0.19	Low	.37	.37		
	53-80	2-20	1.50-1.70	0.60-2.00	0.10-0.19	Low	.37	.37		
ReA:										
Rensselaer-----	0-13	15-27	1.30-1.45	0.60-2.00	0.22-0.24	Low	.28	.28	5	6
	13-38	20-35	1.30-1.60	0.60-2.00	0.17-0.22	Low	.37	.37		
	38-55	18-35	1.40-1.60	0.60-2.00	0.15-0.19	Low	.37	.37		
	55-71	2-20	1.50-1.70	0.60-2.00	0.10-0.19	Low	.37	.37		
	71-80	27-40	1.60-1.80	0.06-0.60	0.07-0.10	Moderate	.32	.37		
RgA:										
Rensselaer-----	0-10	18-27	1.20-1.45	0.60-2.00	0.20-0.24	Low	.24	.24	5	6
	10-43	20-35	1.30-1.60	0.60-2.00	0.17-0.22	Low	.37	.37		
	43-49	18-35	1.40-1.60	0.60-2.00	0.15-0.19	Low	.37	.37		
	49-80	2-20	1.50-1.70	0.60-2.00	0.10-0.19	Low	.37	.37		
RoA:										
Roundhead-----	0-12	0-0	0.30-0.55	0.60-6.00	0.35-0.45	---	---	---	5	2
	12-23	35-45	1.35-1.70	0.06-0.60	0.10-0.16	Moderate	.37	.37		
	23-43	5-20	1.30-1.60	2.00-6.00	0.05-0.15	Low	.24	.32		
	43-80	5-15	1.30-1.60	0.60-6.00	0.05-0.15	Low	.49	.55		
SbA:										
Saranac-----	0-11	27-35	1.30-1.50	0.60-2.00	0.18-0.22	Moderate	.28	.28	5	7
	11-64	35-55	1.40-1.70	0.06-0.60	0.12-0.20	Moderate	.32	.32		
	64-80	22-35	1.30-1.50	0.06-0.60	0.10-0.20	Moderate	.43	.43		
ScA:										
Saranac-----	0-12	27-35	1.30-1.50	0.60-2.00	0.18-0.22	Moderate	.28	.28	5	7
	12-51	35-55	1.40-1.70	0.06-0.60	0.12-0.20	Moderate	.32	.32		
	51-80	27-40	1.50-1.70	0.20-0.60	0.05-0.10	Moderate	.37	.37		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
							Kw	Kf	T	
	In	Pct	g/cc	In/hr	In/in					
<b>SdB:</b>										
Seward-----	0-10	3-15	1.40-1.60	6.00-20.00	0.08-0.14	Low	.17	.17	5	2
	10-27	5-15	1.40-1.70	6.00-20.00	0.06-0.12	Low	.17	.17		
	27-45	15-30	1.40-1.60	0.60-2.00	0.12-0.17	Low	.32	.32		
	45-64	27-40	1.70-1.90	0.06-0.20	0.07-0.15	Moderate	.32	.37		
	64-80	27-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>SfB:</b>										
Shawtown-----	0-9	12-27	1.30-1.45	0.60-2.00	0.14-0.18	Low	.32	.37	4	6
	9-55	18-35	1.40-1.60	0.60-2.00	0.12-0.16	Low	.24	.28		
	55-63	3-15	1.30-1.70	6.00-20.00	0.02-0.07	Low	.17	.20		
	63-80	23-40	1.80-2.00	0.01-0.20	0.01-0.05	Moderate	.32	.37		
<b>SgC2:</b>										
Shinrock-----	0-4	27-40	1.40-1.60	0.20-0.60	0.17-0.20	Moderate	.37	.37	5	6
	4-29	35-50	1.45-1.70	0.06-0.60	0.11-0.15	Moderate	.28	.32		
	29-80	8-40	1.40-1.65	0.20-2.00	0.10-0.14	Low	.37	.37		
<b>ShA:</b>										
Shoals-----	0-12	18-27	1.30-1.60	0.60-2.00	0.20-0.24	Low	.24	.24	5	6
	12-63	18-33	1.40-1.70	0.60-2.00	0.15-0.22	Low	.32	.32		
	63-80	5-25	1.35-1.65	0.60-6.00	0.05-0.20	Low	.37	.37		
<b>SkA:</b>										
Shoals-----	0-8	18-27	1.30-1.60	0.60-2.00	0.20-0.24	Low	.24	.24	5	6
	8-62	18-33	1.40-1.70	0.60-2.00	0.15-0.22	Low	.32	.32		
	62-80	27-40	1.50-1.70	0.20-0.60	0.05-0.10	Moderate	.37	.37		
<b>SnA:</b>										
Sleeth-----	0-11	12-20	1.30-1.45	0.60-2.00	0.18-0.22	Low	.32	.32	4	5
	11-46	20-32	1.30-1.55	0.60-2.00	0.17-0.22	Low	.37	.37		
	46-59	15-27	1.30-1.60	0.60-2.00	0.13-0.18	Low	.32	.37		
	59-80	2-10	1.30-1.70	6.00-99.90	0.02-0.06	Low	.15	.20		
<b>SoA:</b>										
Sloan-----	0-11	27-35	1.30-1.50	0.60-2.00	0.18-0.22	Moderate	.28	.28	5	7
	11-58	22-35	1.25-1.55	0.20-2.00	0.15-0.19	Low	.32	.37		
	58-80	10-30	1.20-1.50	0.20-2.00	0.13-0.18	Low	.32	.43		
<b>SrA:</b>										
Sloan-----	0-14	27-35	1.30-1.50	0.60-2.00	0.18-0.22	Moderate	.28	.28	5	7
	14-58	22-35	1.25-1.55	0.20-2.00	0.15-0.19	Low	.32	.37		
	58-62	10-30	1.20-1.50	0.20-2.00	0.13-0.18	Low	.32	.43		
	62-80	27-40	1.50-1.70	0.20-0.60	0.05-0.10	Moderate	.37	.37		
<b>ThB:</b>										
Thackery-----	0-17	5-15	1.15-1.60	2.00-6.00	0.12-0.15	Low	.24	.24	4	3
	17-58	20-32	1.30-1.55	0.60-2.00	0.17-0.22	Low	.37	.37		
	58-65	20-32	1.30-1.55	0.60-2.00	0.17-0.22	Low	.37	.37		
	65-80	2-10	1.30-1.70	6.00-99.90	0.02-0.06	Low	.15	.20		
<b>TkA:</b>										
Thackery-----	0-7	15-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	7-57	20-32	1.30-1.55	0.60-2.00	0.17-0.22	Low	.37	.37		
	57-80	2-10	1.30-1.70	6.00-99.90	0.02-0.06	Low	.15	.20		

Table 24.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in		Kw	Kf	T	
TnA:										
Tiderishi-----	0-11	15-25	1.30-1.45	0.60-2.00	0.18-0.22	Low	.24	.24	5	6
	11-42	18-35	1.30-1.70	0.60-2.00	0.12-0.16	Low	.28	.32		
	42-57	15-32	1.45-1.70	0.60-2.00	0.10-0.16	Low	.28	.32		
	57-80	25-35	1.65-1.75	0.06-0.60	0.05-0.10	Moderate	.32	.37		
UdA, UdD. Udorthents										
UrB. Urban land										
W. Water										
WdA:										
Westland-----	0-12	27-35	1.30-1.60	0.60-2.00	0.19-0.24	Moderate	.24	.28	4	6
	12-47	24-35	1.40-1.65	0.60-2.00	0.13-0.19	Low	.28	.32		
	47-54	5-30	1.55-1.70	0.60-2.00	0.07-0.17	Low	.24	.37		
	54-80	1-10	1.50-1.70	20.00-99.90	0.01-0.04	Low	.05	.10		
WeA:										
Westland-----	0-10	15-27	1.30-1.60	0.60-2.00	0.19-0.24	Low	.24	.28	4	6
	10-52	24-35	1.40-1.65	0.60-2.00	0.13-0.19	Low	.28	.32		
	52-59	5-30	1.55-1.70	0.60-2.00	0.07-0.17	Low	.24	.37		
	59-80	1-10	1.50-1.70	20.00-99.90	0.01-0.04	Low	.05	.10		
Rensselaer-----	0-19	15-27	1.30-1.45	0.60-2.00	0.22-0.24	Low	.32	.32	5	6
	19-38	20-35	1.30-1.60	0.60-2.00	0.17-0.22	Low	.37	.37		
	38-58	18-35	1.40-1.60	0.60-2.00	0.15-0.19	Low	.37	.37		
	58-80	2-20	1.50-1.70	0.60-2.00	0.10-0.19	Low	.37	.37		

Table 25.—Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	<u>In</u>	<u>pH</u>	<u>Pct</u>	<u>meq/100 g</u>	<u>Pct</u>
<b>AkA:</b>					
Alvada-----	0-14	5.6-7.3	3.0-8.0	13-32	0
	14-50	6.1-7.8	0.5-2.0	8.0-29	0-5
	50-80	7.4-8.4	0.0-0.5	9.0-22	15-30
<b>AmA:</b>					
Alvada-----	0-10	5.6-7.3	3.0-8.0	16-37	0
	10-44	6.1-7.8	0.5-2.0	8.0-29	0-5
	44-80	7.4-8.4	0.0-0.5	9.0-22	15-30
<b>ArB:</b>					
Arkport-----	0-10	4.5-7.3	0.5-2.0	3.0-13	0
	10-18	4.5-7.3	0.0-1.0	1.0-11	0
	18-65	5.1-7.3	0.0-1.0	1.0-11	0
	65-80	5.6-8.4	0.0-0.5	1.0-4.0	0-5
<b>AuA:</b>					
Aurand-----	0-10	5.6-7.3	2.0-6.0	8.0-28	0
	10-27	5.6-7.8	0.5-2.0	8.0-29	0-5
	27-35	6.6-7.8	0.0-1.0	8.0-23	0-5
	35-44	7.4-8.4	0.0-0.5	11-23	0-20
	44-80	7.4-8.4	0.0-0.5	11-23	15-30
<b>AxA:</b>					
Aurand-----	0-12	5.6-7.3	2.0-6.0	13-28	0
	12-27	5.6-7.8	0.5-2.0	8.0-29	0-5
	27-33	6.6-7.8	0.0-1.0	8.0-23	0-5
	33-46	7.4-8.4	0.0-0.5	11-23	0-20
	46-80	7.4-8.4	0.0-0.5	11-23	15-30
<b>BoA:</b>					
Blount-----	0-9	5.1-7.3	2.0-4.0	13-22	0
	9-21	4.5-7.3	0.0-1.0	14-30	0-5
	21-55	6.1-8.4	0.0-0.5	11-26	0-25
	55-80	7.4-8.4	0.0-0.5	11-25	22-35
<b>BoB:</b>					
Blount-----	0-8	5.1-7.3	2.0-4.0	13-22	0
	8-30	4.5-7.3	0.0-1.0	14-30	0-5
	30-45	6.1-8.4	0.0-0.5	11-26	0-25
	45-80	7.4-8.4	0.0-0.5	11-25	22-35
<b>BrA:</b>					
Blount-----	0-9	5.1-7.3	2.0-4.0	13-22	0
	9-26	4.5-7.3	0.0-1.0	14-30	0-5
	26-52	6.1-8.4	0.0-0.5	11-26	0-25
	52-80	7.4-8.4	0.0-0.5	11-25	22-35
<b>Jenera-----</b>	0-9	5.6-7.3	1.0-3.0	6.0-18	0
	9-31	5.6-7.3	0.5-1.0	8.0-23	0
	31-44	6.1-7.8	0.5-1.0	7.0-23	0-5
	44-80	7.4-8.4	0.0-0.5	10-22	15-35

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
<b>BsA:</b>					
Blount-----	0-8	5.1-7.3	2.0-4.0	13-22	0
	8-33	4.5-7.3	0.0-1.0	14-30	0-5
	33-51	6.1-8.4	0.0-0.5	11-26	0-25
	51-80	7.4-8.4	0.0-0.5	11-25	22-35
Urban land.					
<b>CyA:</b>					
Cygnet-----	0-12	5.1-7.3	1.0-3.0	7.0-18	0
	12-50	5.1-7.3	0.5-1.0	8.0-23	0
	50-80	7.4-8.4	0.0-0.5	11-26	20-35
<b>DaA:</b>					
Darroch-----	0-12	5.6-7.3	2.0-4.0	9.0-24	0
	12-57	5.6-7.3	0.5-1.0	8.0-23	0
	57-80	7.4-8.4	0.0-0.5	2.0-13	10-40
<b>EmB:</b>					
Eldean-----	0-10	5.6-7.3	1.0-3.0	8.0-21	0
	10-22	5.6-7.3	0.5-1.0	15-30	0-5
	22-27	6.6-7.8	0.5-1.0	7.0-20	0-50
	27-80	7.4-8.4	0.5-1.0	1.0-4.0	40-65
<b>FdA:</b>					
Flatrock-----	0-11	5.6-7.3	1.0-3.0	9.0-22	0
	11-52	6.1-7.8	0.5-1.0	8.0-23	0-5
	52-64	6.6-8.4	0.5-1.0	7.0-23	0-20
	64-66	---	---	---	---
<b>FnB:</b>					
Fox-----	0-11	5.1-7.3	1.0-3.0	6.0-16	0
	11-33	5.6-7.8	0.0-0.5	7.0-22	0-15
	33-80	7.4-8.4	0.0-0.5	0.0-4.0	5-45
<b>FnD2:</b>					
Fox-----	0-6	5.1-7.3	0.5-2.0	5.0-14	0
	6-27	5.6-7.8	0.0-0.5	7.0-22	0-15
	27-80	7.4-8.4	0.0-0.5	0.0-4.0	5-45
<b>FoA:</b>					
Fox-----	0-11	5.1-7.3	1.0-3.0	8.0-21	0
	11-30	5.6-7.8	0.0-0.5	7.0-22	0-15
	30-33	5.6-7.8	0.0-0.5	20-30	0-15
	33-80	7.4-8.4	0.0-0.5	0.0-4.0	5-45
<b>FpC2:</b>					
Fox-----	0-3	5.1-7.3	0.5-2.0	5.0-14	0
	3-20	5.6-7.8	0.0-0.5	7.0-22	0-15
	20-80	7.4-8.4	0.0-0.5	0.0-4.0	5-45
<b>Lybrand-----</b>	0-7	5.1-7.3	0.5-2.0	11-28	0
	7-31	5.1-7.8	0.5-1.0	15-32	0-10
	31-56	7.4-8.4	0.0-0.5	11-25	10-35
	56-80	7.4-8.4	0.0-0.5	11-25	20-35
<b>GaA:</b>					
Gallman-----	0-8	5.6-7.3	1.0-3.0	6.0-21	0
	8-65	4.5-7.3	0.0-1.0	6.0-20	0
	65-80	6.1-8.4	0.0-0.5	1.0-10	0-20

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
GaB:					
Gallman-----	0-10	5.6-7.3	1.0-3.0	6.0-21	0
	10-61	4.5-7.3	0.0-1.0	6.0-20	0
	61-80	6.1-8.4	0.0-0.5	1.0-10	0-20
GaC:					
Gallman-----	0-8	5.6-7.3	1.0-3.0	6.0-21	0
	8-62	4.5-7.3	0.0-1.0	6.0-20	0
	62-80	6.1-8.4	0.0-0.5	1.0-10	0-20
GbA:					
Gallman-----	0-12	5.6-7.3	1.0-3.0	9.0-22	0
	12-53	4.5-7.3	0.0-1.0	6.0-20	0
	53-80	6.1-8.4	0.0-0.5	1.0-10	0-20
GkA:					
Glynwood-----	0-9	5.1-7.3	1.0-3.0	8.0-22	0
	9-29	4.5-7.3	0.5-1.0	15-35	0-5
	29-41	6.1-8.4	0.0-0.5	11-27	0-25
	41-80	7.4-8.4	0.0-0.5	11-25	22-35
GkB:					
Glynwood-----	0-9	5.1-7.3	1.0-3.0	8.0-22	0
	9-28	4.5-7.3	0.5-1.0	15-35	0-5
	28-44	6.1-8.4	0.0-0.5	11-27	0-25
	44-80	7.4-8.4	0.0-0.5	11-25	22-35
GmC2:					
Glynwood-----	0-6	5.1-7.3	0.5-2.0	12-28	0
	6-24	4.5-7.3	0.5-1.0	15-35	0-5
	24-34	6.1-8.4	0.0-0.5	11-27	0-25
	34-80	7.4-8.4	0.0-0.5	11-25	22-35
GnB:					
Glynwood-----	0-9	5.1-7.3	1.0-3.0	8.0-22	0
	9-37	4.5-7.3	0.5-1.0	15-35	0-5
	37-47	6.1-8.4	0.0-0.5	11-27	0-25
	47-80	7.4-8.4	0.0-0.5	11-25	22-35
GnC:					
Glynwood-----	0-9	5.1-7.3	1.0-3.0	8.0-22	0
	9-30	4.5-7.3	0.5-1.0	15-35	0-5
	30-46	6.1-8.4	0.0-0.5	11-27	0-25
	46-80	7.4-8.4	0.0-0.5	11-25	22-35
GrB2:					
Glynwood-----	0-7	5.1-7.3	0.5-2.0	12-27	0
	7-31	4.5-7.3	0.5-1.0	15-35	0-5
	31-40	6.1-8.4	0.0-0.5	11-27	0-25
	40-80	7.4-8.4	0.0-0.5	11-25	22-35
GrC2:					
Glynwood-----	0-5	5.1-7.3	0.5-2.0	12-27	0
	5-19	4.5-7.3	0.5-1.0	15-35	0-5
	19-35	6.1-8.4	0.0-0.5	11-27	0-25
	35-80	7.4-8.4	0.0-0.5	11-25	22-35

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
GuB:					
Glynwood-----	0-8	5.1-7.3	1.0-3.0	8.0-22	0
	8-25	4.5-7.3	0.5-1.0	15-35	0-5
	25-40	6.1-8.4	0.0-0.5	11-27	0-25
	40-80	7.4-8.4	0.0-0.5	11-25	22-35
Urban land.					
HgA:					
Harrod-----	0-11	6.6-7.8	3.0-6.0	13-28	0-10
	11-31	6.6-8.4	1.0-3.0	10-26	0-10
	31-33	---	---	---	---
HpA:					
Houcktown-----	0-15	5.6-7.3	0.5-2.0	4.0-15	0
	15-31	5.6-7.8	0.5-2.0	7.0-25	0-5
	31-48	6.6-8.4	0.0-0.5	12-23	0-30
	48-80	7.4-8.4	0.0-0.5	9.0-22	20-30
HpB:					
Houcktown-----	0-10	5.6-7.3	0.5-2.0	4.0-15	0
	10-30	5.6-7.8	0.5-2.0	7.0-25	0-5
	30-48	6.6-8.4	0.0-0.5	12-23	0-30
	48-80	7.4-8.4	0.0-0.5	9.0-22	20-30
HrA:					
Houcktown-----	0-8	5.6-7.3	1.0-3.0	6.0-18	0
	8-35	5.6-7.8	0.5-2.0	7.0-25	0-5
	35-51	6.6-8.4	0.0-0.5	12-23	0-30
	51-80	7.4-8.4	0.0-0.5	9.0-22	20-30
HrB:					
Houcktown-----	0-10	5.6-7.3	1.0-3.0	6.0-18	0
	10-30	5.6-7.8	0.5-2.0	7.0-25	0-5
	30-50	6.6-8.4	0.0-0.5	12-23	0-30
	50-80	7.4-8.4	0.0-0.5	9.0-22	20-30
HsA:					
Houcktown-----	0-10	5.6-7.3	1.0-3.0	6.0-21	0
	10-30	5.6-7.8	0.5-2.0	7.0-25	0-5
	30-48	6.6-8.4	0.0-0.5	12-23	0-30
	48-80	7.4-8.4	0.0-0.5	9.0-22	20-30
HsB:					
Houcktown-----	0-8	5.6-7.3	1.0-3.0	6.0-21	0
	8-23	5.6-7.8	0.5-2.0	7.0-25	0-5
	23-44	6.6-8.4	0.0-0.5	12-23	0-30
	44-80	7.4-8.4	0.0-0.5	9.0-22	20-30
HuC2:					
Houcktown-----	0-8	5.6-7.3	0.5-2.0	6.0-18	0
	8-30	5.6-7.8	0.5-1.0	7.0-25	0-5
	30-50	6.6-8.4	0.0-0.5	12-23	0-30
	50-80	7.4-8.4	0.0-0.5	9.0-22	20-30
Glynwood-----	0-8	5.1-7.3	0.5-2.0	12-27	0
	8-24	4.5-7.3	0.5-1.0	15-35	0-5
	24-34	6.1-8.4	0.0-0.5	11-27	0-25
	34-80	7.4-8.4	0.0-0.5	11-25	22-35

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
<b>HvA:</b>					
Hoytville-----	0-9	6.1-7.3	3.0-6.0	17-35	0
	9-43	6.1-7.8	0.5-1.0	16-32	0-15
	43-58	7.4-8.4	0.5-1.0	14-30	15-30
	58-80	7.4-8.4	0.0-0.5	11-26	15-30
<b>KnA:</b>					
Knoxdale-----	0-11	6.1-7.3	1.0-3.0	9.0-22	0
	11-55	6.1-7.8	0.5-1.0	7.0-23	0-5
	55-80	6.6-7.8	0.0-0.5	6.0-17	0-5
<b>LbF:</b>					
Lybrand-----	0-10	5.1-7.3	2.0-4.0	11-24	0
	10-30	5.1-7.8	0.5-1.0	15-32	0-10
	30-42	7.4-8.4	0.0-0.5	11-25	10-35
	42-80	7.4-8.4	0.0-0.5	11-25	20-35
<b>LcD2:</b>					
Lybrand-----	0-4	5.1-7.3	0.5-2.0	12-27	0
	4-38	5.1-7.8	0.5-1.0	15-32	0-10
	38-54	7.4-8.4	0.0-0.5	11-25	10-35
	54-80	7.4-8.4	0.0-0.5	11-25	20-35
<b>MbA:</b>					
Medway-----	0-19	6.1-7.8	3.0-6.0	13-28	0
	19-58	6.1-7.8	0.5-1.0	7.0-21	0-5
	58-80	6.1-8.4	0.5-1.0	3.0-18	0-10
<b>MmA:</b>					
Millsdale-----	0-13	6.1-7.3	4.0-7.0	19-35	0
	13-35	6.1-8.4	0.5-2.0	15-31	0-15
	35-37	---	---	---	---
<b>MnA:</b>					
Milton-----	0-10	5.1-7.3	3.0-5.0	12-25	0
	10-23	5.1-7.3	0.5-1.0	8.0-23	0
	23-28	6.1-7.8	0.0-0.5	14-26	0-15
	28-30	---	---	---	---
<b>NpA:</b>					
Nappanee-----	0-9	5.1-7.3	1.0-3.0	12-27	0
	9-37	5.1-7.8	0.0-1.0	18-38	0-5
	37-52	7.4-8.4	0.0-0.5	11-26	15-30
	52-80	7.4-8.4	0.0-0.5	11-26	15-30
<b>PaA:</b>					
Patton-----	0-10	6.1-7.3	3.0-5.0	16-31	0
	10-27	6.1-7.8	1.0-3.0	12-33	0-10
	27-60	7.4-8.4	0.0-1.0	8.0-23	10-25
	60-80	7.4-8.4	0.0-0.5	6.0-17	10-25
<b>PmA:</b>					
Pewamo-----	0-11	5.6-7.3	3.0-5.0	17-34	0
	11-53	5.6-7.8	0.5-2.0	15-34	0-5
	53-80	7.4-8.4	0.0-1.0	11-25	15-30

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
PoA:					
Pewamo-----	0-12	5.6-7.3	3.0-5.0	17-34	0
	12-52	5.6-7.8	0.5-2.0	15-34	0-5
	52-80	7.4-8.4	0.0-1.0	11-25	15-30
Urban land.					
Pp, Ps, Pt. Pits					
RdA:					
Rensselaer-----	0-12	6.1-7.3	2.0-6.0	10-29	0
	12-38	6.1-7.3	0.5-2.0	9.0-25	0
	38-53	6.6-7.8	0.0-1.0	8.0-23	0-10
	53-80	7.4-8.4	0.0-0.5	1.0-13	5-25
ReA:					
Rensselaer-----	0-13	6.1-7.3	2.0-6.0	10-29	0
	13-38	6.1-7.3	0.5-2.0	9.0-25	0
	38-55	6.6-7.8	0.0-1.0	8.0-23	0-10
	55-71	7.4-8.4	0.0-0.5	1.0-13	5-25
	71-80	7.4-8.4	0.0-0.5	11-25	15-35
RgA:					
Rensselaer-----	0-10	6.1-7.3	2.0-6.0	13-28	0
	10-43	6.1-7.3	0.5-2.0	9.0-25	0
	43-49	6.6-7.8	0.0-1.0	8.0-23	0-10
	49-80	7.4-8.4	0.0-0.5	1.0-13	5-25
RoA:					
Roundhead-----	0-12	5.1-7.3	55-75	110-150	0
	12-23	5.6-7.8	0.5-1.0	15-29	0-5
	23-43	7.4-8.4	0.0-0.5	2.0-13	5-30
	43-80	7.4-8.4	0.0-0.5	2.0-13	10-40
SbA:					
Saranac-----	0-11	6.1-7.8	3.0-6.0	17-33	0-5
	11-64	6.1-7.8	0.5-2.0	15-34	0-5
	64-80	6.6-8.4	0.0-1.0	9.0-23	10-25
ScA:					
Saranac-----	0-12	6.1-7.8	3.0-6.0	17-33	0-5
	12-51	6.1-7.8	0.5-2.0	15-34	0-5
	51-80	7.4-8.4	0.0-0.5	11-25	15-30
SdB:					
Seward-----	0-10	5.1-7.3	1.0-3.0	3.0-15	0
	10-27	5.1-7.3	0.5-1.0	3.0-11	0
	27-45	5.1-7.3	0.5-1.0	7.0-20	0
	45-64	6.1-7.8	0.0-0.5	11-25	0-25
	64-80	7.4-8.4	0.0-0.5	11-25	22-35
SfB:					
Shawtown-----	0-9	5.1-7.3	1.0-3.0	7.0-22	0
	9-55	5.1-7.3	0.0-0.5	7.0-22	0
	55-63	7.4-8.4	0.0-0.5	1.0-10	15-25
	63-80	7.4-8.4	0.0-0.5	9.0-25	15-30

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
SgC2:					
Shinrock-----	0-4	5.6-7.3	0.5-2.0	12-28	0
	4-29	5.1-7.3	0.5-1.0	15-32	0-5
	29-80	7.4-8.4	0.0-0.5	3.0-25	10-25
ShA:					
Shoals-----	0-12	6.1-7.8	2.0-4.0	12-27	0-5
	12-63	6.6-8.4	0.5-2.0	8.0-24	0-10
	63-80	6.6-8.4	0.0-1.0	3.0-17	0-25
SkA:					
Shoals-----	0-8	6.1-7.8	2.0-4.0	12-27	0-5
	8-62	6.6-8.4	0.5-2.0	8.0-24	0-10
	62-80	7.4-8.4	0.0-0.5	11-25	15-30
SnA:					
Sleeth-----	0-11	5.6-7.3	1.0-3.0	6.0-18	0
	11-46	5.1-7.3	0.5-1.0	9.0-21	0
	46-59	5.6-7.8	0.0-0.5	6.0-17	0-10
	59-80	7.4-8.4	0.0-0.5	1.0-7.0	20-55
SoA:					
Sloan-----	0-11	6.1-7.8	3.0-6.0	17-33	0-5
	11-58	6.1-8.4	0.5-1.0	10-23	0-20
	58-80	6.6-8.4	0.0-0.5	4.0-19	0-40
SrA:					
Sloan-----	0-14	6.1-7.8	3.0-6.0	17-33	0-5
	14-58	6.1-8.4	0.5-1.0	10-23	0-20
	58-62	6.6-8.4	0.0-0.5	4.0-19	0-40
	62-80	7.4-8.4	0.0-0.5	11-25	15-30
ThB:					
Thackery-----	0-17	5.6-7.3	0.5-2.0	3.0-13	0
	17-58	5.1-7.3	0.5-1.0	9.0-21	0
	58-65	6.6-7.8	0.5-1.0	9.0-21	0-10
	65-80	7.4-8.4	0.0-0.5	1.0-7.0	10-35
TkA:					
Thackery-----	0-7	5.6-7.3	1.0-3.0	8.0-22	0
	7-57	5.1-7.3	0.5-1.0	9.0-21	0
	57-80	7.4-8.4	0.0-0.5	1.0-7.0	10-35
TnA:					
Tiderishi-----	0-11	5.1-7.3	3.0-5.0	12-25	0
	11-42	5.1-7.3	0.5-1.0	8.0-23	0
	42-57	6.1-7.8	0.0-0.5	6.0-20	0-15
	57-80	7.4-8.4	0.0-0.5	10-22	15-35
UdA, UdD. Udorthents					
UrB. Urban land					
W. Water					

Table 25.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation- exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
WdA:					
Westland-----	0-12	6.1-7.3	2.0-5.0	10-26	0
	12-47	6.1-7.3	0.5-2.0	10-25	0
	47-54	6.6-7.8	0.5-2.0	3.0-22	0-25
	54-80	7.4-8.4	0.0-0.5	0.0-7.0	25-45
WeA:					
Westland-----	0-10	6.1-7.3	2.0-5.0	10-26	0
	10-52	6.1-7.3	0.5-2.0	10-25	0
	52-59	6.6-7.8	0.5-2.0	3.0-22	0-25
	59-80	7.4-8.4	0.0-0.5	0.0-7.0	25-45
Rensselaer-----	0-19	6.1-7.3	2.0-6.0	10-29	0
	19-38	6.1-7.3	0.5-2.0	9.0-25	0
	38-58	6.6-7.8	0.0-1.0	8.0-23	0-10
	58-80	7.4-8.4	0.0-0.5	1.0-13	5-25

Table 26.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
AkA, AmA: Alvada-----	B	Jan-May Jun-Oct Nov-Dec	0.0-1.0 --- 0.0-1.0	3.3-5.0 --- 3.3-5.0	Perched --- Perched	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Occasional --- Occasional	--- --- ---	None None None
ArB: Arkport-----	B	Jan-Dec	>6.0	>6.0	---	---	---	---	---	None
AuA, AxA: Aurand-----	C	Jan-May Jun-Nov Dec	0.5-1.5 --- 0.5-1.5	3.3-5.0 --- 3.3-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
BoA, BoB: Blount-----	C	Jan-Apr May-Nov Dec	0.5-1.0 --- 0.5-1.0	2.5-5.0 --- 2.5-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
BrA: Blount-----	C	Jan-Apr May-Nov Dec	0.5-1.0 --- 0.5-1.0	2.5-5.0 --- 2.5-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
Jenera-----	B	Jan-Apr May-Nov Dec	1.0-2.0 --- 1.0-2.0	3.3-5.0 --- 3.3-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
BsA: Blount-----	C	Jan-Apr May-Nov Dec	0.5-1.0 --- 0.5-1.0	2.5-5.0 --- 2.5-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
Urban land.										
CyA: Cygnet-----	B	Jan-Apr May-Dec	1.0-2.0 ---	3.3-5.0 ---	Perched ---	--- ---	--- ---	--- ---	--- ---	None None
DaA: Darroch-----	B	Jan-Apr May-Nov Dec	1.0-2.0 --- 1.0-2.0	>6.0 --- >6.0	Apparent --- Apparent	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None

Table 26.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
EmB: Eldean-----	B	Jan-Dec	>6.0	>6.0	---	---	---	---	---	None
FdA: Flatrock-----	B	Jan-Apr May-Nov Dec	1.0-2.0 --- 1.0-2.0	>6.0 --- >6.0	Apparent --- Apparent	--- --- ---	--- --- ---	--- --- ---	Brief --- Brief	Occasional None Occasional
FnB, FnD2, FoA: Fox-----	B	Jan-Dec	>6.0	>6.0	---	---	---	---	---	None
FpC2: Fox-----	B	Jan-Dec	>6.0	>6.0	---	---	---	---	---	None
Lybrand-----	C	Jan Feb-Apr May-Dec	--- 3.3-5.0 ---	--- 3.5-5.0 ---	--- Perched ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
GaA, GaB, GaC: Gallman-----	B	Jan-Dec	>6.0	>6.0	---	---	---	---	---	None
GbA: Gallman-----	B	Jan-Apr May-Dec	4.0-6.0 >6.0	>6.0 >6.0	Apparent ---	--- ---	--- ---	--- ---	--- ---	None None
GkA, GkB, GmC2, GnB, GnC, GrB2, GrC2: Glynwood-----	C	Jan-Apr May-Dec	1.0-2.0 ---	2.1-4.2 ---	Perched ---	--- ---	--- ---	--- ---	--- ---	None None
GuB: Glynwood-----	C	Jan-Apr May-Dec	1.0-2.0 ---	2.1-4.2 ---	Perched ---	--- ---	--- ---	--- ---	--- ---	None None
Urban land.										
HgA: Harrod-----	B	Jan-Apr May-Jun Jul-Oct Nov Dec	1.0-2.0 --- --- --- 1.0-2.0	>3.3 --- --- --- >3.3	Apparent --- --- --- Apparent	--- --- --- --- ---	--- --- --- --- ---	--- --- --- --- ---	Brief Brief --- Brief Brief	Frequent Frequent None Frequent Frequent

Table 26.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
HpA, HpB, HrA, HrB, HsA, HsB: Houcktown-----	B	Jan-Apr May-Oct Nov-Dec	1.0-2.0 --- 1.0-2.0	3.3-5.0 --- 3.3-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
HuC2: Houcktown-----	B	Jan-Apr May-Oct Nov-Dec	1.0-2.0 --- 1.0-2.0	3.3-5.0 --- 3.3-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
Glynwood-----	C	Jan-Apr May-Dec	1.0-2.0 ---	2.1-4.2 ---	Perched ---	--- ---	--- ---	--- ---	--- ---	None None
HvA: Hoytville-----	C	Jan-Apr May-Dec	0.0-1.0 ---	4.0-5.5 ---	Perched ---	0.0-1.0 ---	Brief ---	Frequent ---	--- ---	None None
KnA: Knoxdale-----	B	Jan-Apr May-Nov Dec	3.5-6.0 --- 3.5-6.0	>6.0 --- >6.0	Apparent --- Apparent	--- --- ---	--- --- ---	--- --- ---	Brief --- Brief	Occasional None Occasional
LbF, LcD2: Lybrand-----	C	Jan Feb-Apr May-Dec	--- 3.3-5.0 ---	--- 3.5-5.0 ---	--- Perched ---	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
MbA: Medway-----	B	Jan-Apr May-Jun Jul-Oct Nov Dec	1.0-2.0 --- --- --- 1.0-2.0	>6.0 --- --- --- >6.0	Apparent --- --- --- Apparent	--- --- --- --- ---	--- --- --- --- ---	--- --- --- --- ---	Brief Brief --- Brief Brief	Occasional Occasional None Occasional Occasional
MmA: Millsdale-----	C	Jan-May Jun-Oct Nov-Dec	0.0-1.0 --- 0.0-1.0	>3.3 --- >3.3	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Occasional --- Occasional	--- --- ---	None None None
MnA: Milton-----	C	Jan-Apr May-Nov Dec	1.5-3.0 --- 1.5-3.0	>3.3 --- >3.3	Apparent --- Apparent	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None

Table 26.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
NpA: Nappanee-----	D	Jan-May Jun-Oct Nov-Dec	0.5-1.0 --- 0.5-1.0	2.5-5.0 --- 2.5-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
PaA: Patton-----	B	Jan-May Jun-Nov Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Occasional --- Occasional	--- --- ---	None None None
PmA: Pewamo-----	C	Jan-May Jun-Nov Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Frequent --- Frequent	--- --- ---	None None None
PoA: Pewamo-----	C	Jan-May Jun-Nov Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Frequent --- Frequent	--- --- ---	None None None
Urban land.										
Pp, Ps, Pt. Pits										
RdA, ReA, RgA: Rensselaer-----	B	Jan-May Jun-Nov Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Occasional --- Occasional	--- --- ---	None None None
RoA: Roundhead-----	B	Jan-Jun Jul-Nov Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Frequent --- Frequent	--- --- ---	None None None
SbA: Saranac-----	C	Jan-May Jun-Sep Oct Nov Dec	0.0-1.0 --- 0.0-1.0 0.0-1.0 0.0-1.0	>6.0 --- >6.0 >6.0 >6.0	Apparent --- Apparent Apparent Apparent	0.0-0.5 --- --- --- 0.0-0.5	Brief --- --- --- Brief	Occasional --- --- --- Occasional	Brief --- --- Brief Brief	Rare None None Rare Rare
ScA: Saranac-----	C	Jan-May Jun-Sep Oct Nov Dec	0.0-1.0 --- 0.0-1.0 0.0-1.0 0.0-1.0	>6.0 --- >6.0 >6.0 >6.0	Apparent --- Apparent Apparent Apparent	0.0-0.5 --- --- --- 0.0-0.5	Brief --- --- --- Brief	Occasional --- --- --- Occasional	Very brief --- --- Very brief Very brief	Frequent None None Frequent Frequent

Table 26.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
SdB: Seward-----	B	Jan-Apr May-Dec	1.5-3.0 ---	4.0-6.0 ---	Perched ---	--- ---	--- ---	--- ---	--- ---	None None
SfB: Shawtown-----	B	Jan-Apr May-Nov Dec	2.0-3.5 --- 2.0-3.5	4.2-5.8 --- 4.2-5.8	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
SgC2: Shinrock-----	C	Jan-May Jun-Nov Dec	1.0-2.0 --- 1.0-2.0	2.5-4.5 --- 2.5-4.5	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
ShA, SkA: Shoals-----	C	Jan-Apr May-Jun Jul-Oct Nov-Dec	0.5-1.5 --- --- ---	>6.0 --- --- ---	Apparent --- --- ---	--- --- --- ---	--- --- --- ---	--- --- --- ---	Brief Brief --- Brief	Occasional Occasional None Occasional
SnA: Sleeth-----	B	Jan-Apr May-Dec	0.5-1.5 ---	>6.0 ---	Apparent ---	--- ---	--- ---	--- ---	--- ---	None None
SoA: Sloan-----	B	Jan-Jun Jul-Oct Nov-Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Frequent --- Frequent	Brief --- Brief	Occasional None Occasional
SrA: Sloan-----	B	Jan-Jun Jul-Oct Nov-Dec	0.0-1.0 --- 0.0-1.0	>6.0 --- >6.0	Apparent --- Apparent	0.0-1.0 --- 0.0-1.0	Brief --- Brief	Frequent --- Frequent	Brief --- Brief	Frequent None Frequent
ThB, TkA: Thackery-----	B	Jan-May Jun-Nov Dec	1.0-2.5 --- 1.0-2.5	>6.0 --- >6.0	Apparent --- Apparent	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
TnA: Tiderishi-----	C	Jan-Apr May-Oct Nov-Dec	0.5-1.5 --- 0.5-1.5	3.3-5.0 --- 3.3-5.0	Perched --- Perched	--- --- ---	--- --- ---	--- --- ---	--- --- ---	None None None
UdA, UdD. Udorthents										

Table 26.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
UrB. Urban land										
W. Water										
WdA: Westland-----	B	Jan-May	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	Occasional	---	None
		Jun-Nov	---	---	---	---	---	---	---	None
		Dec	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	Occasional	---	None
WeA: Westland-----	B	Jan-May	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	Occasional	---	None
		Jun-Nov	---	---	---	---	---	---	---	None
		Dec	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	Occasional	---	None
Rensselaer-----	B	Jan-May	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	Occasional	---	None
		Jun-Nov	---	---	---	---	---	---	---	None
		Dec	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	Occasional	---	None

Table 27.—Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer		Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Initial	Total		Uncoated steel	Concrete
		<u>In</u>	<u>In</u>	<u>In</u>			
AkA, AmA: Alvada-----	---	>80	---	0	High-----	High-----	Low.
ArB: Arkport-----	---	>80	---	0	Moderate----	Low-----	Moderate.
AuA, AxA: Aurand-----	Dense material	40-60	---	0	High-----	High-----	Moderate.
BoA, BoB: Blount-----	Dense material	30-60	---	0	High-----	High-----	Moderate.
BrA: Blount-----	Dense material	30-60	---	0	High-----	High-----	Moderate.
Jenera-----	Dense material	40-60	---	0	High-----	Moderate----	Moderate.
BsA: Blount-----	Dense material	30-60	---	0	High-----	High-----	Moderate.
Urban land.							
CyA: Cygnnet-----	Dense material	40-60	---	0	High-----	Moderate----	Moderate.
DaA: Darroch-----	---	>80	---	0	High-----	High-----	Moderate.
EmB: Eldean-----	---	>80	---	0	Moderate----	High-----	Moderate.
FdA: Flatrock-----	Bedrock (lithic)	60-80	---	0	High-----	Moderate----	Low.
FnB, FnD2, FoA: Fox-----	---	>80	---	0	Moderate----	Low-----	Moderate.
FpC2: Fox-----	---	>80	---	0	Moderate----	Low-----	Moderate.
Lybrand-----	Dense material	40-60	---	0	Moderate----	High-----	Moderate.
GaA, GaB, GaC, GbA: Gallman-----	---	>80	---	0	Moderate----	Low-----	Moderate.
GkA, GkB, GmC2, GnB, GnC, GrB2, GrC2: Glynwood-----	Dense material	25-50	---	0	High-----	High-----	Moderate.
GuB: Glynwood-----	Dense material	25-50	---	0	High-----	High-----	Moderate.
Urban land.							

Table 27.—Soil Features—Continued

Map symbol and soil name	Restrictive layer		Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Initial	Total		Uncoated steel	Concrete
		In	In	In			
HgA: Harrod-----	Bedrock (lithic)	20-40	---	0	High-----	High-----	Low.
HpA, HpB, HrA, HrB, HsA, HsB: Houcktown-----	Dense material	40-60	---	0	High-----	Moderate----	Moderate.
HuC2: Houcktown-----	Dense material	40-60	---	0	High-----	Moderate----	Moderate.
Glynwood-----	Dense material	25-50	---	0	High-----	High-----	Moderate.
HvA: Hoytville-----	Dense material	50-70	---	0	High-----	High-----	Low.
KnA: Knoxdale-----	---	>80	---	0	High-----	Low-----	Low.
LbF, LcD2: Lybrand-----	Dense material	40-60	---	0	Moderate----	High-----	Moderate.
MbA: Medway-----	---	>80	---	0	High-----	High-----	Low.
MmA: Millsdale-----	Bedrock (lithic)	20-40	---	0	High-----	High-----	Low.
MnA: Milton-----	Bedrock (lithic)	20-40	---	0	Moderate----	High-----	Moderate.
NpA: Nappanee-----	Dense material	40-60	---	0	High-----	High-----	Moderate.
PaA: Patton-----	---	>80	---	0	High-----	High-----	Low.
PmA: Pewamo-----	---	>80	---	0	High-----	High-----	Moderate.
PoA: Pewamo-----	---	>80	---	0	High-----	High-----	Moderate.
Urban land-----	---	---		0	---	---	---
Pp, Ps, Pt. Pits							
RdA, ReA, RgA: Rensselaer-----	---	>80	---	0	High-----	High-----	Low.
RoA: Roundhead-----	---	>80	1-2	2-4	High-----	High-----	Low.
SbA, ScA: Saranac-----	---	>80	---	0	High-----	High-----	Low.
SdB: Seward-----	Dense material	40-65	---	0	Moderate----	High-----	Moderate.

Table 27.—Soil Features—Continued

Map symbol and soil name	Restrictive layer		Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top <u>In</u>	Initial <u>In</u>	Total <u>In</u>		Uncoated steel	Concrete
SfB: Shawtown-----	Dense material	50-70	---	0	Moderate----	Low-----	Moderate.
SgC2: Shinrock-----	---	>80	---	0	High-----	High-----	Moderate.
ShA, SkA: Shoals-----	---	>80	---	0	High-----	High-----	Low.
SnA: Sleeth-----	---	>80	---	0	High-----	High-----	Moderate.
SoA, SrA: Sloan-----	---	>80	---	0	High-----	High-----	Low.
ThB, TkA: Thackery-----	---	>80	---	0	High-----	Moderate----	Moderate.
TnA: Tiderishi-----	---	>80	---	0	High-----	High-----	Moderate.
UdA, UdD. Udorthents							
UrB. Urban land							
W. Water							
WdA: Westland-----	---	>80	---	0	High-----	High-----	Low.
WeA: Westland-----	---	>80	---	0	High-----	High-----	Low.
Rensselaer-----	---	>80	---	0	High-----	High-----	Low.

Table 28.—Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alvada-----	Fine-loamy, mixed, active, mesic Typic Argiaquolls
Arkport-----	Coarse-loamy, mixed, active, mesic Lamellic Hapludalfs
Aurand-----	Fine-loamy, mixed, active, mesic Aquic Argiudolls
Blount-----	Fine, illitic, mesic Aeric Epiaqualfs
Cygnat-----	Fine-loamy, mixed, active, mesic Aquic Hapludalfs
Darrock-----	Fine-loamy, mixed, superactive, mesic Aquic Argiudolls
Eldan-----	Fine, mixed, superactive, mesic Typic Hapludalfs
Flatrock-----	Fine-loamy, mixed, active, mesic Fluvaquentic Eutrochrepts
Fox-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludalfs
Gallman-----	Fine-loamy, mixed, active, mesic Typic Hapludalfs
Glynwood-----	Fine, illitic, mesic Aquic Hapludalfs
Harrod-----	Fine-loamy, mixed, superactive, mesic Fluvaquentic Hapludolls
Houcktown-----	Fine-loamy, mixed, active, mesic Aquic Hapludalfs
Hoytville-----	Fine, illitic, mesic Mollic Epiaqualfs
Jenera-----	Fine-loamy, mixed, active, mesic Aquic Hapludalfs
*Knoxdale-----	Fine-loamy, mixed, active, mesic Dystric Fluventic Eutrochrepts
Lybrand-----	Fine, illitic, mesic Typic Hapludalfs
*Medway-----	Fine-loamy, mixed, superactive, mesic Fluvaquentic Hapludolls
Millsdale-----	Fine, mixed, active, mesic Typic Argiaquolls
*Milton-----	Fine, mixed, active, mesic Typic Hapludalfs
Nappanee-----	Fine, illitic, mesic Aeric Epiaqualfs
Patton-----	Fine-silty, mixed, superactive, mesic Typic Endoaquolls
Pewamo-----	Fine, mixed, active, mesic Typic Argiaquolls
Rensselaer-----	Fine-loamy, mixed, superactive, mesic Typic Argiaquolls
*Roundhead-----	Fine-silty, mixed, superactive, calcareous, mesic Histic Humaquepts
Saranac-----	Fine, mixed, active, mesic Fluvaquentic Endoaquolls
*Seward-----	Coarse-loamy over clayey, mixed, active, mesic Oxyaquic Hapludalfs
Shawtown-----	Fine-loamy, mixed, active, mesic Oxyaquic Hapludalfs
Shinrock-----	Fine, illitic, mesic Aquic Hapludalfs
Shoals-----	Fine-loamy, mixed, superactive, nonacid, mesic Aeric Fluvaquents
Sleeth-----	Fine-loamy, mixed, active, mesic Aeric Endoaqualfs
Sloan-----	Fine-loamy, mixed, superactive, mesic Fluvaquentic Endoaquolls
Thackery-----	Fine-loamy, mixed, active, mesic Aquic Hapludalfs
Tiderishi-----	Fine-loamy, mixed, active, mesic Aquic Argiudolls
Udorthents-----	Mixed, mesic Udorthents
Westland-----	Fine-loamy, mixed, superactive, mesic Typic Argiaquolls

Table 29.—Interpretive Groups

(A complex is treated as a single management unit in the "Land capability classification" and "Prime farmland" columns. See text for definitions of the groups. Absence of an entry indicates that the map unit is not suited to the intended use or is not rated)

Map symbol and soil name	Land capability classification	Pasture and hayland suitability group	Prime farmland	Hydric
AkA, AmA----- Alvada	2w	C-1	Prime farmland if drained	Yes
ArB----- Arkport	2e	B-1	All areas are prime farmland	No
AuA, AxA----- Aurand	2w	C-1	Prime farmland if drained	No
BoA----- Blount	2w	C-1	Prime farmland if drained	No
BoB----- Blount	2e	C-1	Prime farmland if drained	No
BrA----- Blount----- Jenera-----	2w	C-1 A-6	Prime farmland if drained	No No
BsA----- Blount----- Urban land-----	---	Not rated Not rated	Not prime farmland	No Unranked
CyA----- Cygnet	1	A-6	All areas are prime farmland	No
DaA----- Darroch	2w	C-1	Prime farmland if drained	No
EmB----- Eldean	2e	B-1	All areas are prime farmland	No
FdA----- Flatrock	2w	A-5	All areas are prime farmland	No
FnB----- Fox	2e	A-1	All areas are prime farmland	No
FnD2----- Fox	4e	B-1	Not prime farmland	No
FoA----- Fox	2s	A-1	All areas are prime farmland	No
FpC2----- Fox----- Lybrand-----	3e	B-1 A-1	Not prime farmland	No No
GaA----- Gallman	1	A-1	All areas are prime farmland	No

Table 29.—Interpretive Groups—Continued

Map symbol and soil name	Land capability classification	Pasture and hayland suitability group	Prime farmland	Hydric
GaB----- Gallman	2e	A-1	All areas are prime farmland	No
GaC----- Gallman	3e	A-1	Not prime farmland	No
GbA----- Gallman	1	A-1	All areas are prime farmland	No
GkA----- Glynwood	1	A-6	All areas are prime farmland	No
GkB----- Glynwood	2e	A-6	All areas are prime farmland	No
GmC2----- Glynwood	4e	A-6	Not prime farmland	No
GnB----- Glynwood	2e	A-6	All areas are prime farmland	No
GnC----- Glynwood	3e	A-6	Not prime farmland	No
GrB2----- Glynwood	3e	A-6	All areas are prime farmland	No
GrC2----- Glynwood	4e	A-6	Not prime farmland	No
GuB----- Glynwood----- Urban land-----	---	Not rated Not rated	Not prime farmland	No Unranked
HgA----- Harrod	3w	B-3	Prime farmland if protected from flooding or not frequently flooded during the growing season	No
HpA----- Houcktown	1	A-6	All areas are prime farmland	No
HpB----- Houcktown	2e	A-6	All areas are prime farmland	No
HrA----- Houcktown	1	A-6	All areas are prime farmland	No
HrB----- Houcktown	2e	A-6	All areas are prime farmland	No
HsA----- Houcktown	1	A-6	All areas are prime farmland	No
HsB----- Houcktown	2e	A-6	All areas are prime farmland	No
HuC2----- Houcktown-Glynwood	3e	A-6	Not prime farmland	No

Table 29.—Interpretive Groups—Continued

Map symbol and soil name	Land capability classification	Pasture and hayland suitability group	Prime farmland	Hydric
HvA----- Hoytville	2w	C-1	Prime farmland if drained	Yes
KnA----- Knoxdale	2w	A-5	All areas are prime farmland	No
LbF----- Lybrand	7e	A-3	Not prime farmland	No
LcD2----- Lybrand	4e	A-1	Not prime farmland	No
MbA----- Medway	2w	A-5	All areas are prime farmland	No
MmA----- Millsdale	3w	C-2	Prime farmland if drained	Yes
MnA----- Milton	2s	F-1	All areas are prime farmland	No
NpA----- Nappanee	3w	C-2	Prime farmland if drained	No
PaA----- Patton	2w	C-1	Prime farmland if drained	Yes
PmA----- Pewamo	2w	C-1	Prime farmland if drained	Yes
PoA----- Pewamo----- Urban land-----	---	Not rated Not rated	Not prime farmland	Yes Unranked
Pp, Ps, Pt----- Pits	---	Not rated	Not prime farmland	Unranked
RdA, ReA, RgA----- Rensselaer	2w	C-1	Prime farmland if drained	Yes
RoA----- Roundhead	3w	D-1	Prime farmland if drained	Yes
SbA----- Saranac	3w	C-2	Prime farmland if drained	Yes
ScA----- Saranac	3w	C-3	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	Yes
SdB----- Seward	2e	A-1	All areas are prime farmland	No
SfB----- Shawtown	2e	A-1	All areas are prime farmland	No
SgC2----- Shinrock	3e	A-6	Not prime farmland	No

Table 29.—Interpretive Groups—Continued

Map symbol and soil name	Land capability classification	Pasture and hayland suitability group	Prime farmland	Hydric
ShA, SkA----- Shoals	2w	C-3	Prime farmland if drained	No
SnA----- Sleeth	2w	C-1	Prime farmland if drained	No
SoA----- Sloan	3w	C-3	Prime farmland if drained	Yes
SrA----- Sloan	3w	C-3	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	Yes
ThB, TkA----- Thackery	1	A-6	All areas are prime farmland	No
TnA----- Tiderishi	2w	C-1	Prime farmland if drained	No
UdA, UdD----- Udorthents	---	Not rated	Not prime farmland	No
UrB----- Urban land	---	Not rated	Not prime farmland	Unranked
W. Water				
WdA----- Westland	2w	C-1	Prime farmland if drained	Yes
WeA----- Westland-Rensselaer	2w	C-1	Prime farmland if drained	Yes

# **NRCS Accessibility Statement**

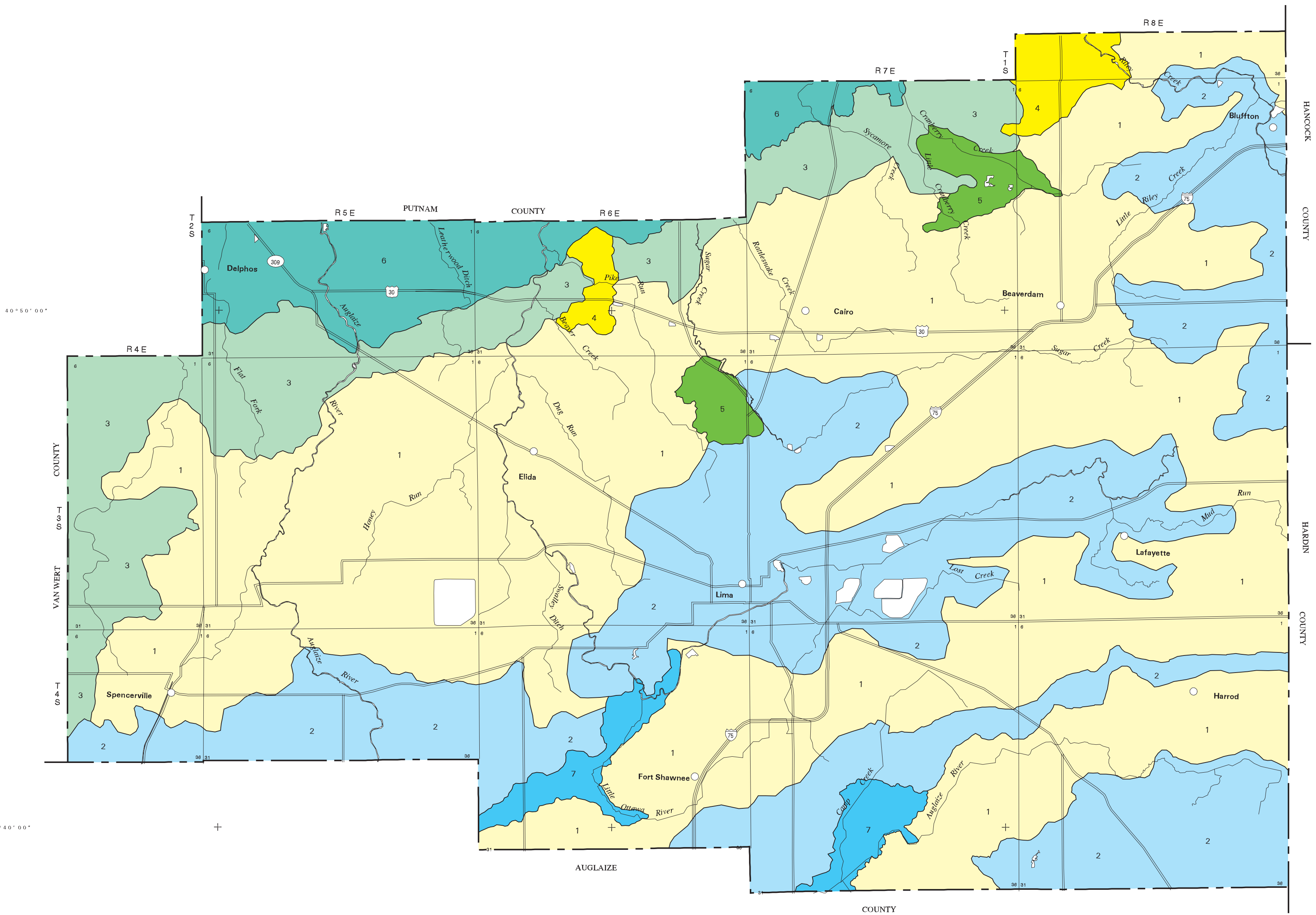
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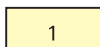


84°20'00"

84°00'00"



SOIL LEGEND



Blount-Pewamo



Blount-Glynwood-Pewamo



Pewamo-Blount



Cygnnet-Rensselaer-Alvada



Rensselaer-Cygnnet-Gallman



Hoytville-Shawtown



Westland-Gallman-Thackery

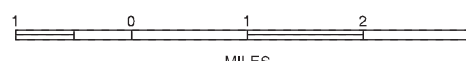
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SECTIONALIZED  
TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE  
ALLEN SOIL AND WATER CONSERVATION DISTRICT  
ALLEN COUNTY COMMISSIONERS  
OHIO DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF SOIL AND WATER CONSERVATION  
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER  
OHIO STATE UNIVERSITY EXTENSION

**GENERAL SOIL MAP  
ALLEN COUNTY,  
OHIO**

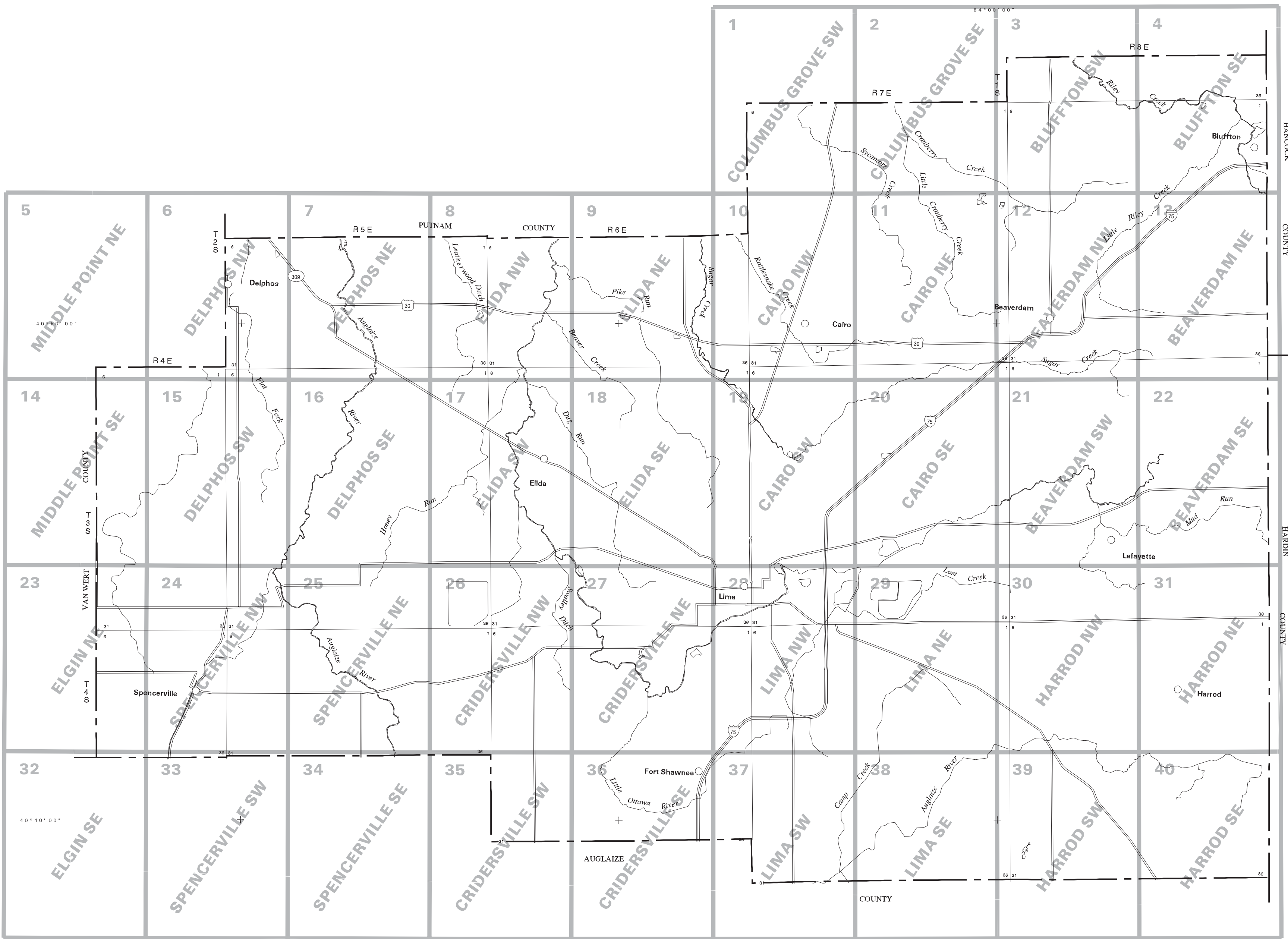


SCALE = 1:105000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



84°20'00"



SECTIONALIZED TOWNSHIP					
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS  
ALLEN COUNTY,  
OHIO



SCALE = 1:105000

# SOIL LEGEND

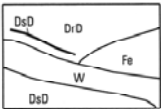
Map symbols consist of a combination of letters or letters and numbers. The first capital letter is the initial one of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping or eroded phases. The second capital letter indicates the slope. Symbols without a slope letter are for miscellaneous areas. A final number of 2 indicates that the soil is eroded.

SYMBOL	NAME
AkA	Alvada loam, 0 to 1 percent slopes
AmA	Alvada silty clay loam, 0 to 1 percent slopes
ArB	Arkport loamy fine sand, 2 to 6 percent slopes
AuA	Aurand loam, 0 to 3 percent slopes
AxA	Aurand silt loam, 0 to 3 percent slopes
BoA	Blount silt loam, 0 to 2 percent slopes
BoB	Blount silt loam, 2 to 4 percent slopes
BrA	Blount-Jenera complex, 0 to 3 percent slopes
BsA	Blount-Urban land complex, 0 to 2 percent slopes
CyA	Cygnat loam, 0 to 3 percent slopes
DaA	Darroch loam, 0 to 2 percent slopes
EmB	Eldean silt loam, 1 to 4 percent slopes
FdA	Fiatrock silt loam, limestone substratum, 0 to 2 percent slopes, occasionally flooded
FnB	Fox loam, 2 to 6 percent slopes
FnD2	Fox loam, 12 to 18 percent slopes, eroded
FoA	Fox silt loam, 0 to 2 percent slopes
FpC2	Fox-Lybrand complex, 6 to 12 percent slopes, eroded
GaA	Gallman loam, 0 to 2 percent slopes
GaB	Gallman loam, 2 to 6 percent slopes
GaC	Gallman loam, 6 to 12 percent slopes
GbA	Gallman silt loam, 0 to 2 percent slopes
GkA	Glynwood loam, 0 to 2 percent slopes
GkB	Glynwood loam, 2 to 4 percent slopes
GmC2	Glynwood clay loam, 6 to 12 percent slopes, eroded
GnB	Glynwood silt loam, 2 to 6 percent slopes
GnC	Glynwood silt loam, 6 to 12 percent slopes
GrB2	Glynwood silty clay loam, 2 to 6 percent slopes, eroded
GrC2	Glynwood silty clay loam, 6 to 12 percent slopes, eroded
GuB	Glynwood-Urban land complex, 2 to 6 percent slopes
HgA	Harrod silt loam, 0 to 1 percent slopes, frequently flooded
HpA	Houcktown sandy loam, 0 to 2 percent slopes
HpB	Houcktown sandy loam, 2 to 4 percent slopes
HrA	Houcktown loam, 0 to 2 percent slopes
HrB	Houcktown loam, 2 to 6 percent slopes
HsA	Houcktown silt loam, 0 to 2 percent slopes
HsB	Houcktown silt loam, 2 to 4 percent slopes
HuC2	Houcktown-Glynwood complex, 6 to 12 percent slopes, eroded
HvA	Hoytville silty clay loam, 0 to 1 percent slopes
KnA	Knoxdale silt loam, 0 to 2 percent slopes, occasionally flooded
LbF	Lybrand silt loam, 20 to 55 percent slopes
LcD2	Lybrand silty clay loam, 12 to 20 percent slopes, eroded
MbA	Medway silt loam, 0 to 2 percent slopes, occasionally flooded
MmA	Millsdale silty clay loam, 0 to 1 percent slopes
MnA	Milton loam, 0 to 2 percent slopes
NpA	Nappanee clay loam, 0 to 2 percent slopes
PaA	Patton silty clay loam, loamy substratum, 0 to 1 percent slopes
PmA	Pewamo silty clay loam, 0 to 1 percent slopes
PoA	Pewamo-Urban land complex, 0 to 2 percent slopes
Pp	Pits, gravel
Ps	Pits, lime
Pt	Pits, quarry
RdA	Rensselaer loam, 0 to 1 percent slopes
ReA	Rensselaer loam, till substratum, 0 to 1 percent slopes
RgA	Rensselaer silt loam, 0 to 1 percent slopes
RoA	Roundhead muck, loamy substratum, 0 to 1 percent slopes
SbA	Saranac silty clay loam, 0 to 1 percent slopes, rarely flooded
ScA	Saranac silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded
SdB	Seward loamy fine sand, deep phase, 0 to 5 percent slopes
SfB	Shawtown loam, 2 to 6 percent slopes
SgC2	Shinrock clay loam, 6 to 12 percent slopes, eroded
ShA	Shoals silt loam, 0 to 1 percent slopes, occasionally flooded
SkA	Shoals silt loam, till substratum, 0 to 1 percent slopes, occasionally flooded
SnA	Sleeth silt loam, 0 to 2 percent slopes
SoA	Sloan silty clay loam, 0 to 1 percent slopes, occasionally flooded
SbA	Sloan silty clay loam, till substratum, 0 to 1 percent slopes, frequently flooded
ThA	Thackery sandy loam, sandy substratum, 1 to 3 percent slopes
TkA	Thackery loam, sandy substratum, 0 to 2 percent slopes
TnA	Tiderishi loam, 0 to 2 percent slopes
UdA	Udorthents, loamy, 0 to 2 percent slopes
UdD	Udorthents, loamy, 12 to 25 percent slopes
UrB	Urban land, undulating
W	Water
WdA	Westland clay loam, 0 to 1 percent slopes
WeA	Westland-Rensselaer complex, 0 to 1 percent slopes

CONVENTIONAL AND SPECIAL  
SYMBOLS LEGEND

SOIL SURVEY FEATURES

SOIL DELINEATIONS AND SYMBOLS



STANDARD LANDFORM AND  
MISCELLANEOUS SURFACE FEATURES

Escarpment, nonbedrock



Marsh or swamp



Miscellaneous water



Perennial water



Short steep slope



Wet spot



AD HOC FEATURES

Typical pedon



CULTURAL FEATURES

BOUNDARIES

County or parish



Minor civil division



Map sheet neatline



Quadrangle matchline (shown in white)



Public land survey system section corner tics



TRANSPORTATION (shown in white)

Divided road



Other road



ROAD EMBLEMS & DESIGNATIONS

Interstate



Federal



State



LOCATED OBJECTS



Cemetery



Church



School

HYDROGRAPHIC FEATURES

Drainage end (indicates direction of flow)



Perennial stream



Intermittent stream

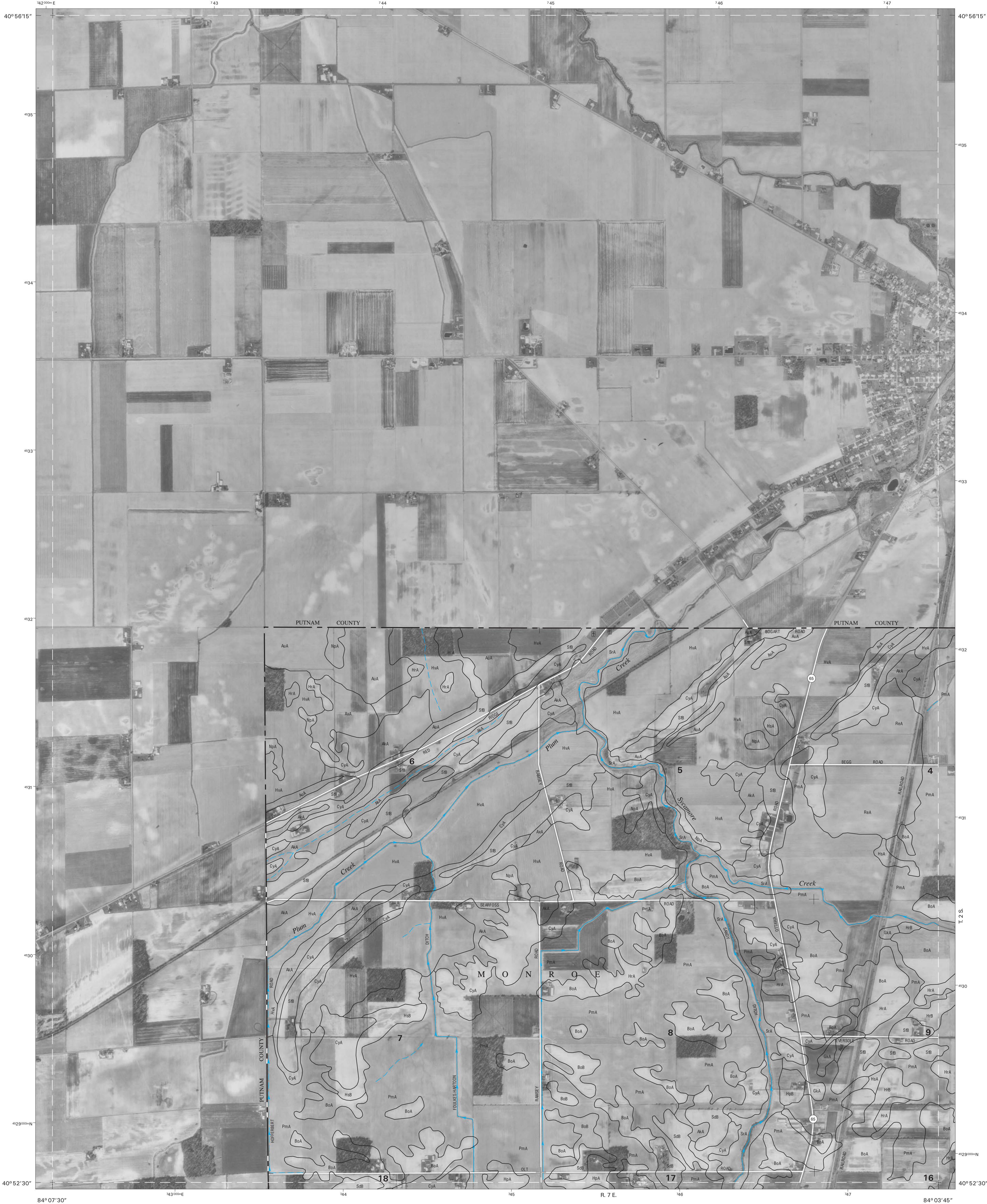


Perennial drainage or irrigation ditch



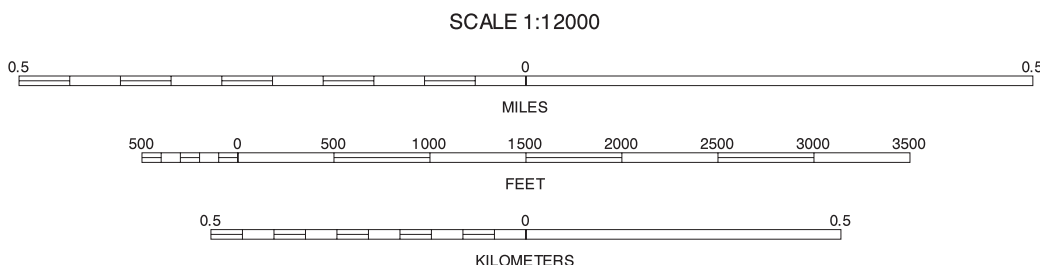
Intermittent drainage or irrigation ditch





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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



2	COLUMBUS GROVE SE
9	ELIDA NE
10	CAROL NW
11	CAROL NE

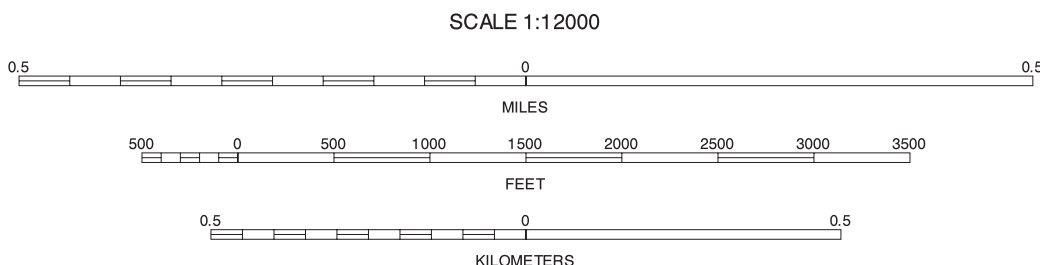
COLUMBUS GROVE SW, OHIO  
37.5 MINUTE SERIES  
SHEET NUMBER 1 OF 40

Soil map delineations extending beyond the dashed white quadrangle neckline are for reference only and are included on adjacent map sheets.



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1	3
10	11
12	

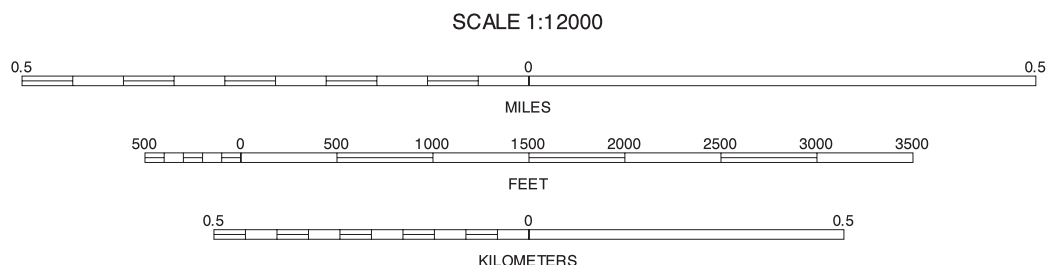
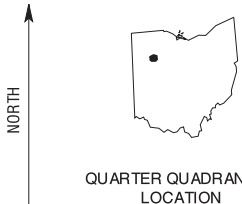
COLUMBUS GROVE SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 2 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheroid. 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



2	4
11	13

2 COLUMBUS GROVE SE  
4 BLUFFTON SE  
11 CAMRO NE  
12 BEAVERDAM NW  
13 BEAVERDAM NE

INDEX TO ADJOINING 3.75 MAPS

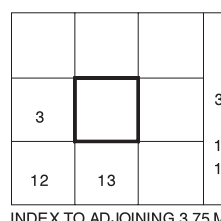
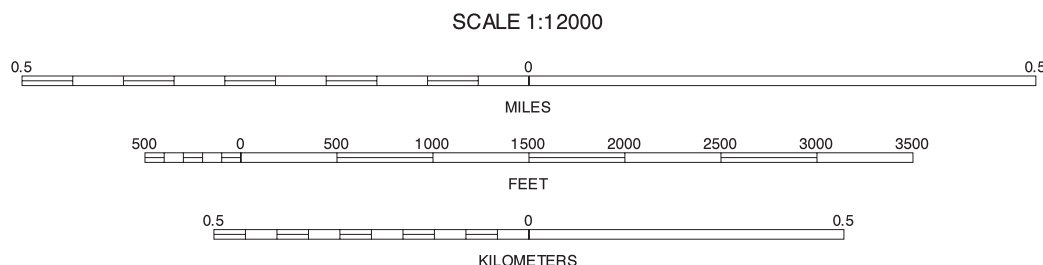
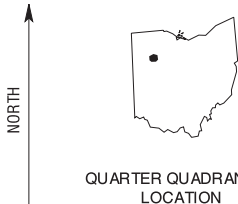
BLUFFTON SW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 3 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



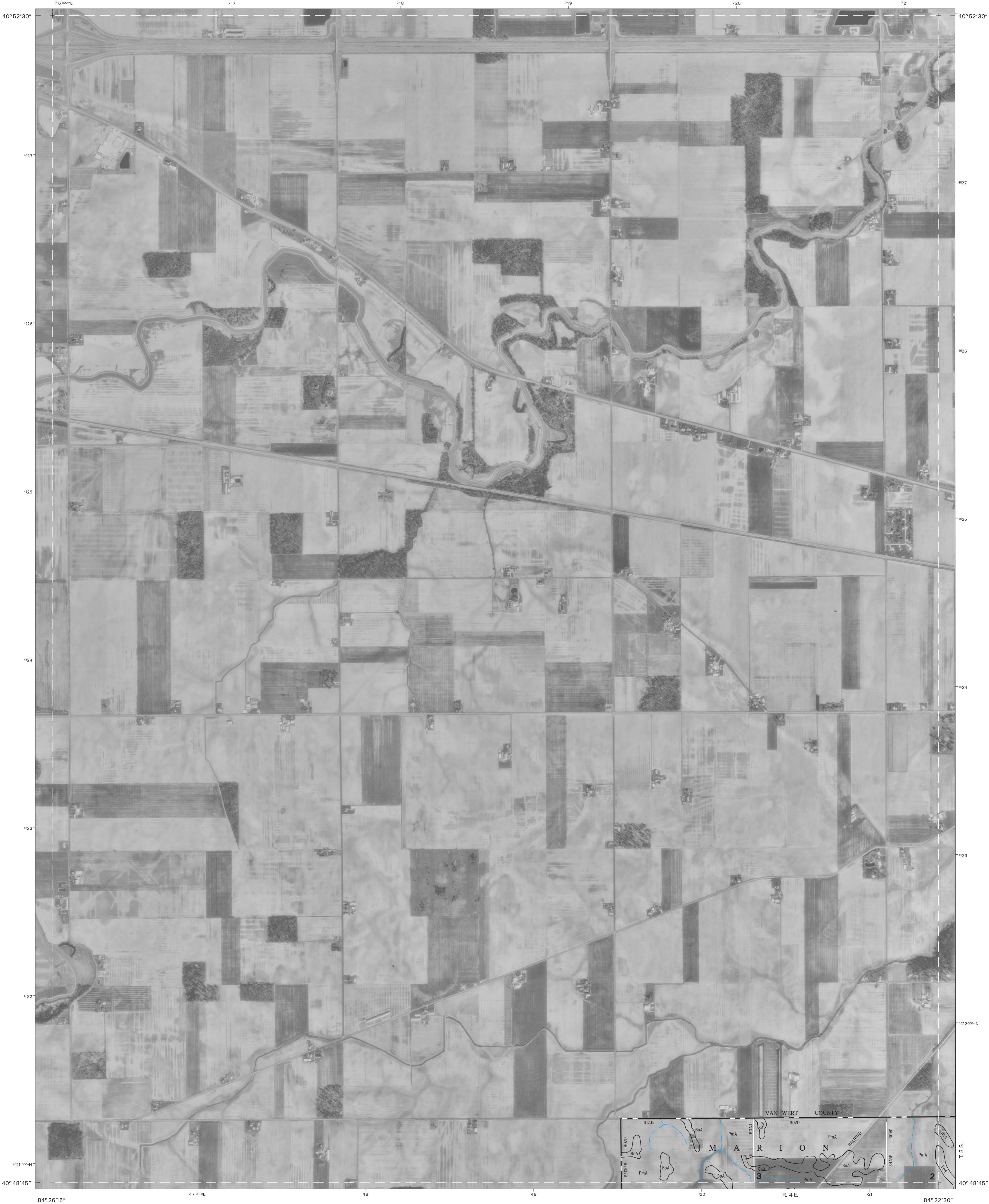
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1985-1989 aerial photography. Hydrography and cultural features were acquired from NRCS. PLSS was acquired from USGS and edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheroid, 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



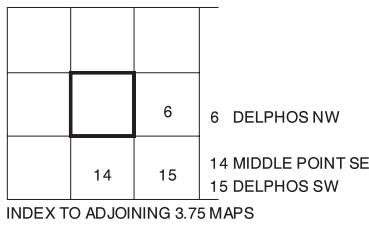
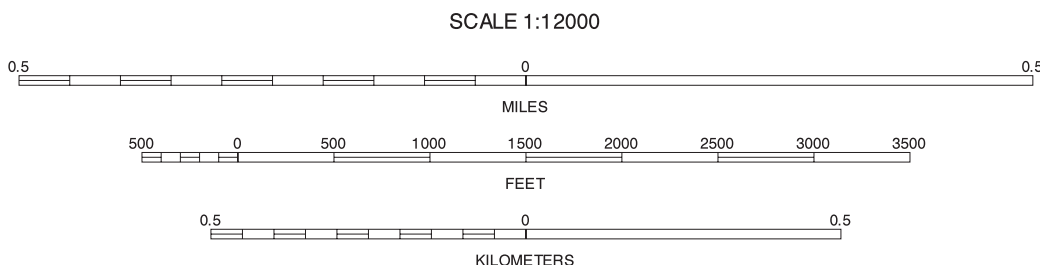
BLUFFTON SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 4 OF 40

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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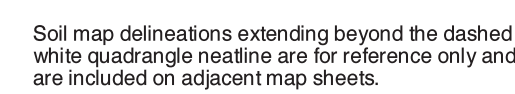
North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

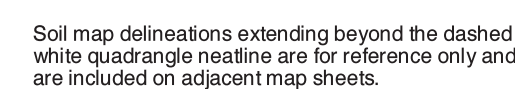


MIDDLE POINT NE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 5 OF 40

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

ALLEN COUNTY, OHIO  
DELPHOS NW QUADRANGLE  
SHEET NUMBER 6 OF 40  
84°18'45"

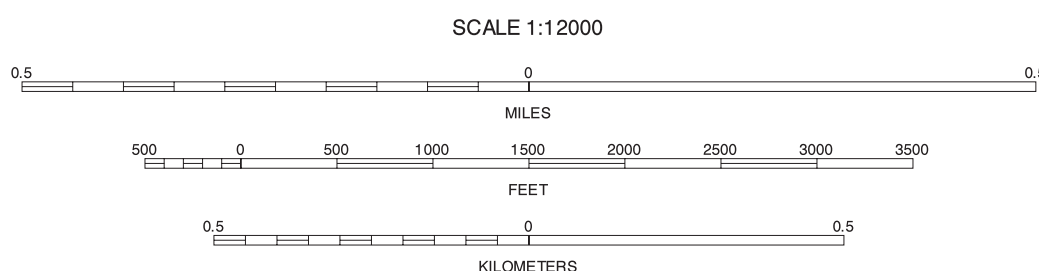
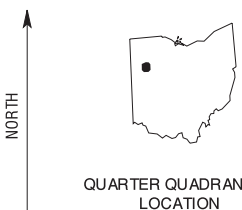






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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



7	8	9
16	17	18

INDEX TO ADJOINING 375 MAPS

7 DELPHOS NE  
8 ELIDANE  
9 DELPHOS SE  
16 ELIDA SW  
17 ELIDA SE  
18 ELIDA SE

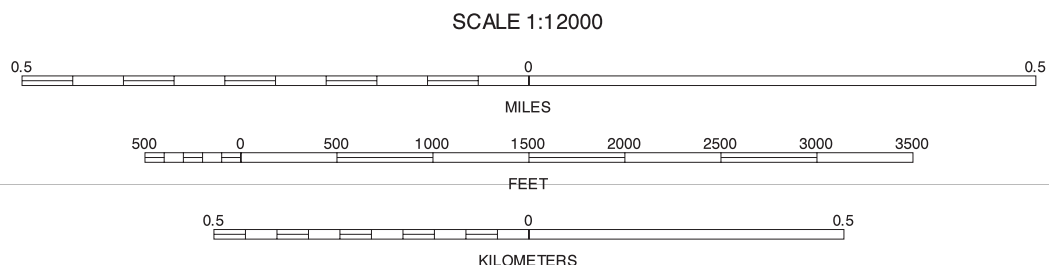
ELIDA NW, OHIO  
375 MINUTE SERIES  
SHEET NUMBER 8 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



1	1 COLUMBUS GROVE SW
8	8 ELIDA NW
10	10 CAIRO NW
17	17 ELIDA SW
18	18 ELIDA SE
19	19 CAIRO SW

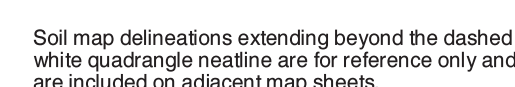
INDEX TO ADJOINING 3.75 MAPS

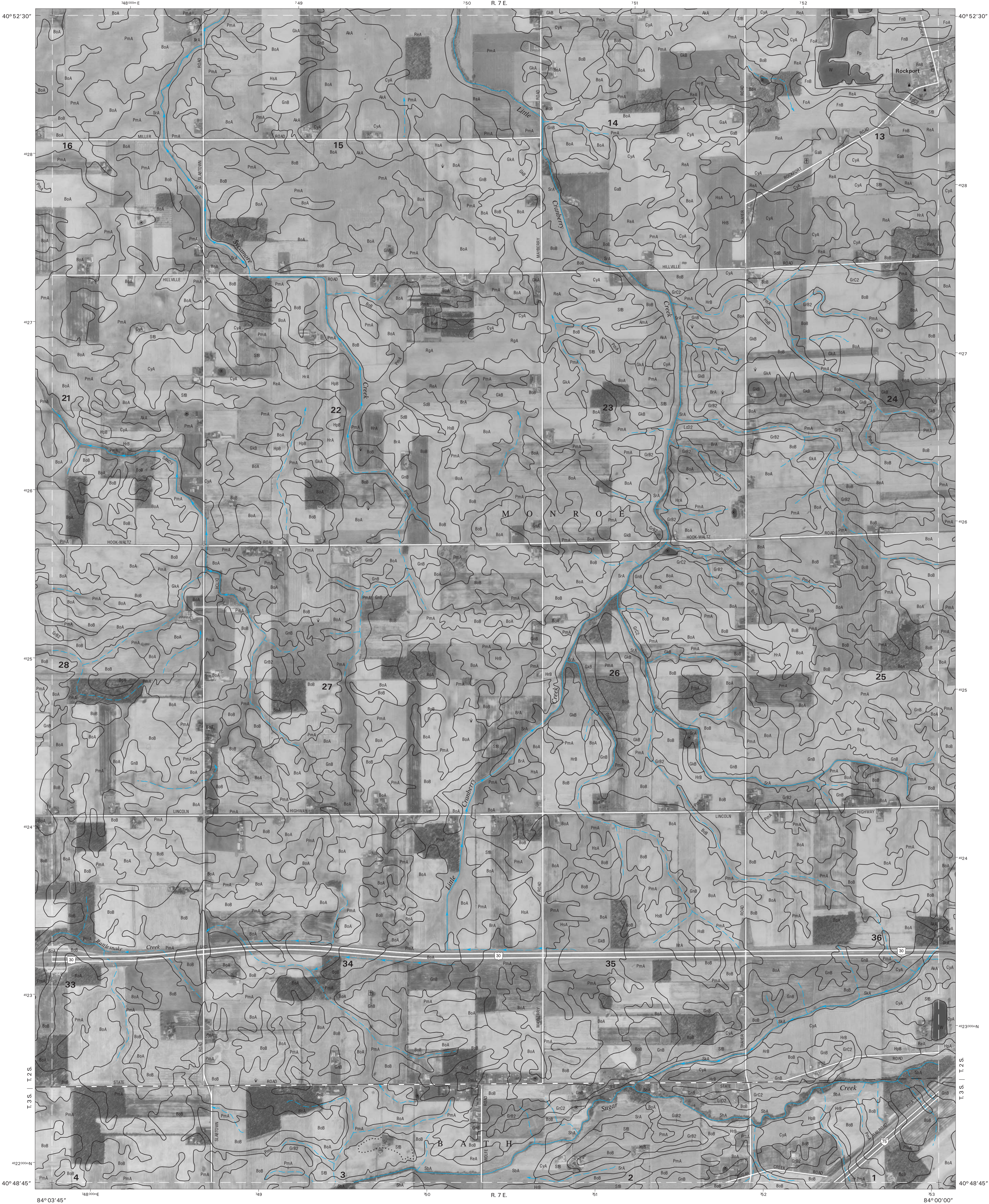
ELIDA NE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 9 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.

ALLEN COUNTY, OHIO  
CAIRO NW QUADRANGLE  
SHEET NUMBER 10 OF 40

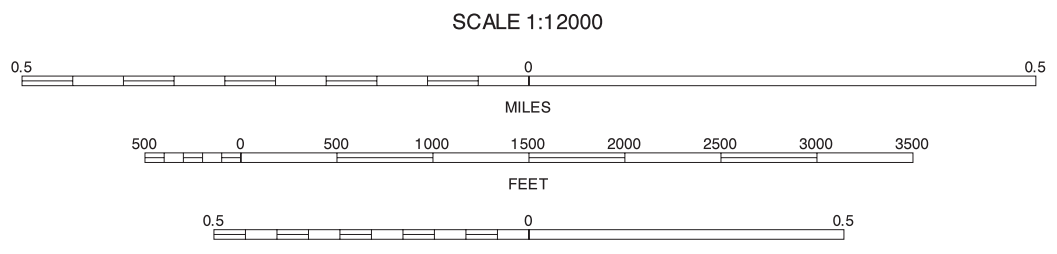
84° 03' 45"





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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



1	2	3
10		12
19	20	21

INDEX TO ADJOINING 3.75 MAPS

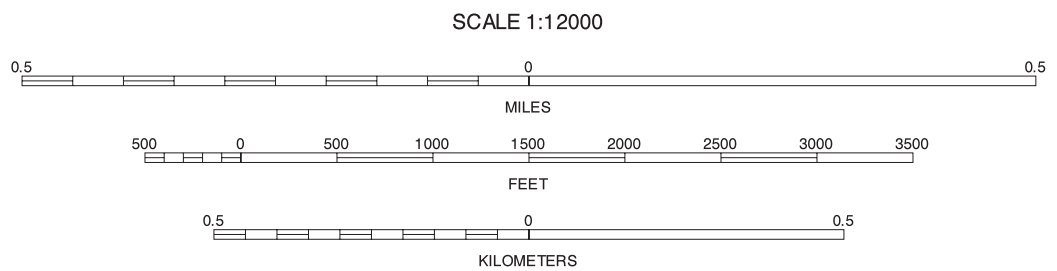
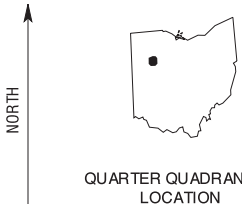
CAIRO NE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 11 OF 40

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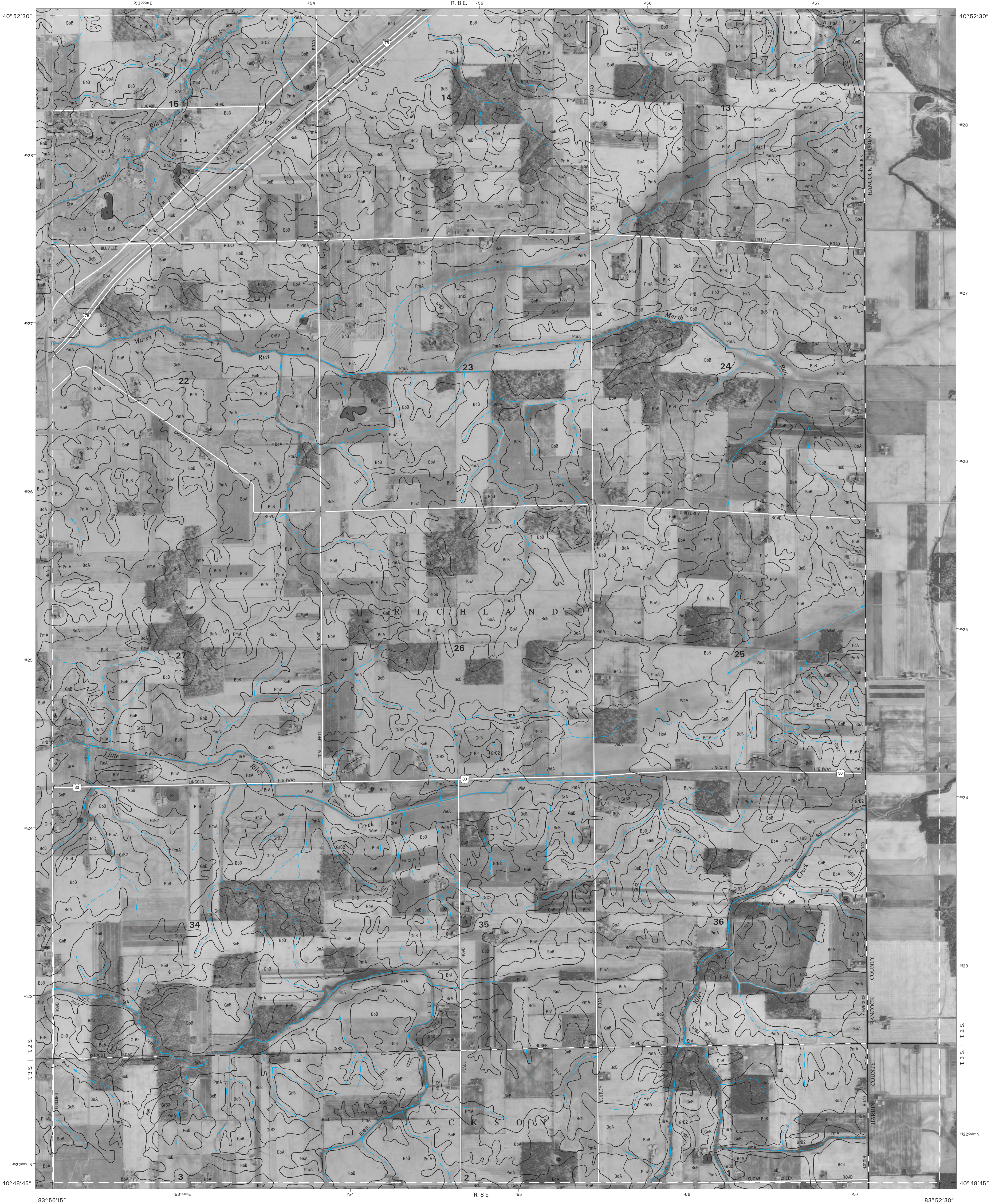
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



2	3	4	2 COLUMBUS GROVE SE
11		13	3 BLUFFTON SW
20	21	22	4 BLUFFTON SE
			11 CAIRO NE
			13 BEAVERDAM NE
			20 CAIRO SE
			21 BEAVERDAM SW
			22 BEAVERDAM SE

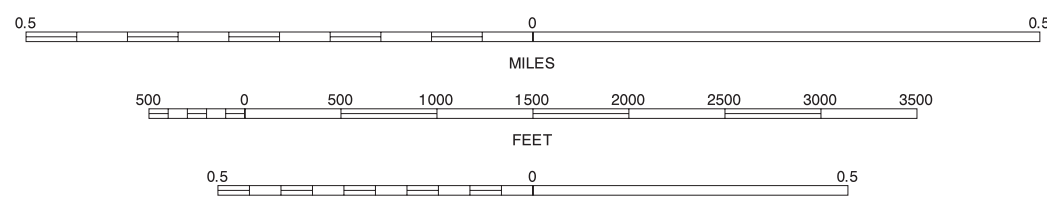
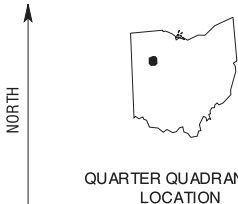
BEAVERDAM NW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 12 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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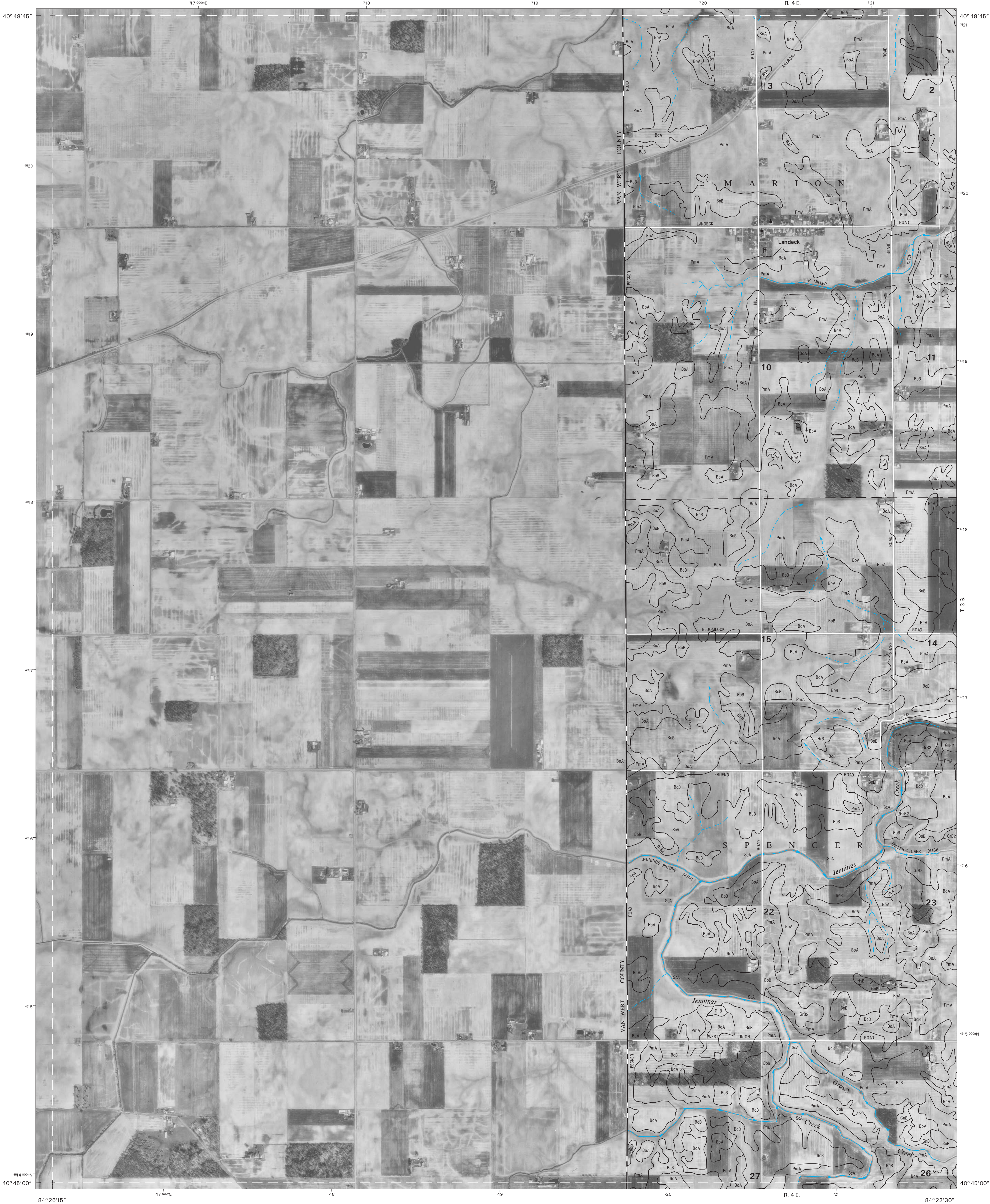
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



3	4	3 BLUFFTON SW
12		4 BLUFFTON SE
21	22	12 BEAVERDAM NW
		21 BEAVERDAM SW
		22 BEAVERDAM SE

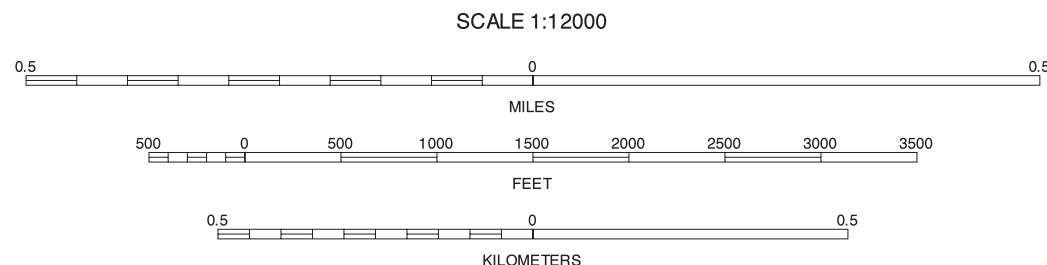
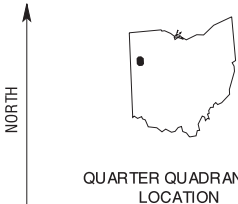
BEAVERDAM NE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 13 OF 40

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North American Datum of 1983 (NAD83), GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



5	6	5 MIDDLE POINT NE
		6 DELPHOS NW
15		15 DELPHOS SW
23	24	23 ELGIN NE
		24 SPENCERVILLE NW

INDEX TO ADJOINING 3.75 MAPS

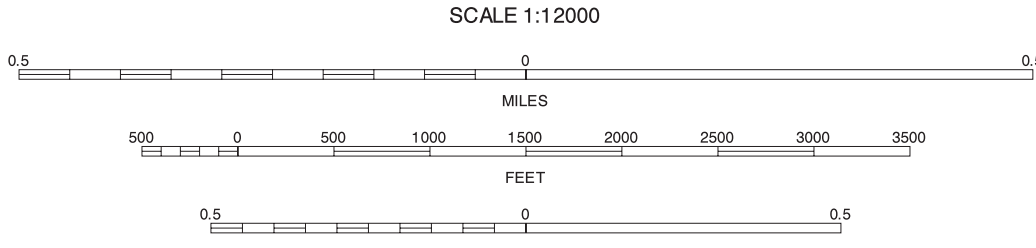
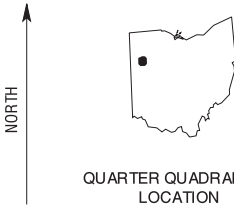
MIDDLE POINT SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 14 OF 40

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North American Datum of 1983 (NAD83). GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



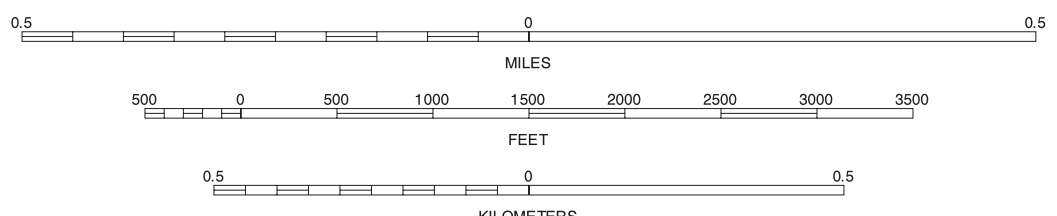
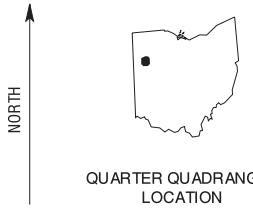
5	6	7	5 MIDDLE POINT NE
14	15	16	6 DELPHOS NW
23	24	25	7 DELPHOS NE
			14 MIDDLE POINT SE
			16 DELPHOS SE
			23 ELON NE
			24 SPENCERVILLE NW
			25 SPENCERVILLE NE

DELPHOS SW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 15 OF 40  
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North American Datum of 1983 (NAD83), GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16, Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



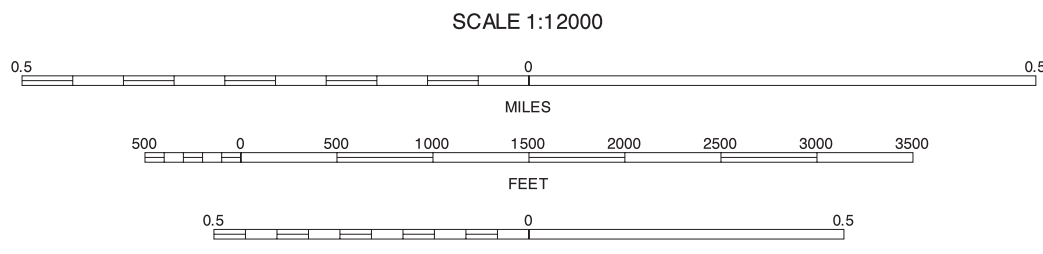
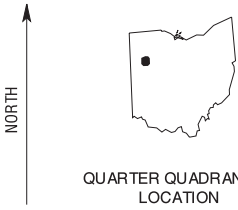
6	7	8	6 DELPHOS NW
15		17	7 DELPHOS NE
24	25	26	8 ELIDA NW
			15 DELPHOS SW
			17 ELIDA SW
			24 SPENCERVILLE NW
			25 SPENCERVILLE NE
			26 CRIDERSVILLE NW

DELPHOS SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 16 OF 40  
Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



7	8	9	7 DELPHOS NE
16		18	8 ELIDA NW
25	26	27	9 ELIDA NE
			16 DELPHOS SE
			18 ELIDA SE
			25 SPENCERVILLE NE
			26 CRIDERSVILLE NW
			27 CRIDERSVILLE NE

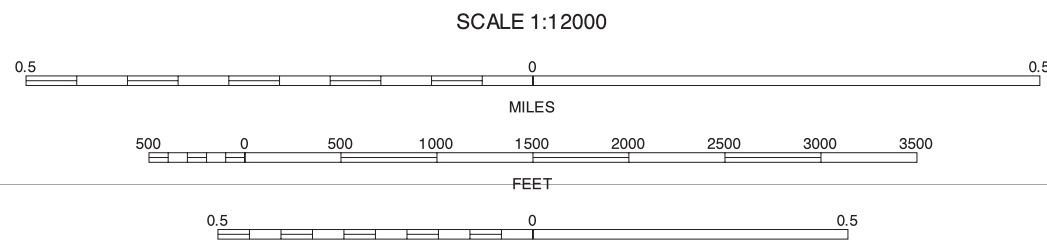
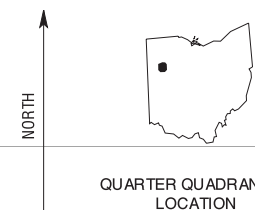
ELIDA SW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 17 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



8	9	10	8 ELIDA NW
17		19	9 ELIDANE
26	27	28	10 CARON NW
			17 ELIDA SW
			19 CARO SW
			26 CRIDERSVILLE NW
			27 CRIDERSVILLE NE
			28 LIMA NW

INDEX TO ADJOINING 37.5 MAPS

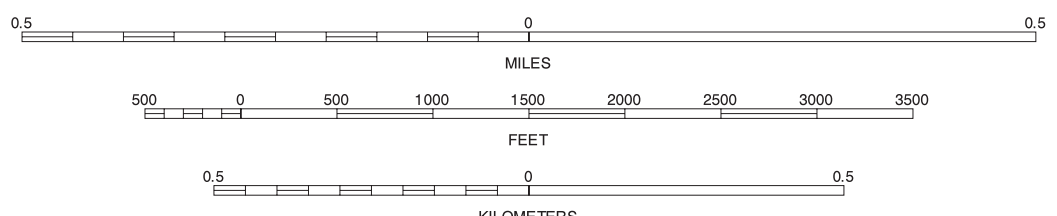
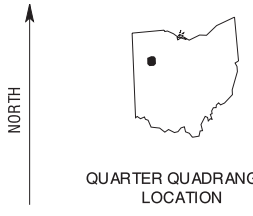
ELIDA SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 18 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



9	10	11	9 ELIDA NE
			10 CAIRO NW
			11 CAIRO NE
18		20	18 ELIDA SE
			20 CAIRO SE
			27 CROOKSVILLE NE
27	28	29	28 LIMA NW
			29 LIMA NE

INDEX TO ADJOINING 3.75 MAPS

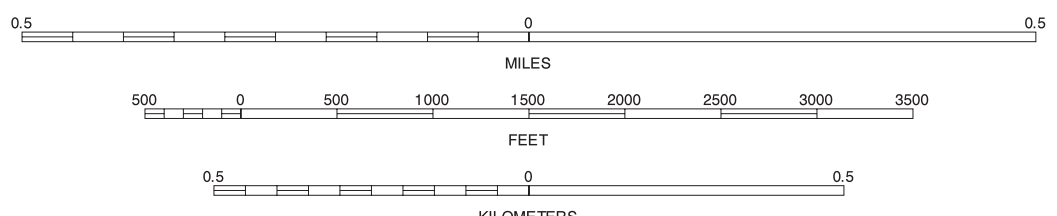
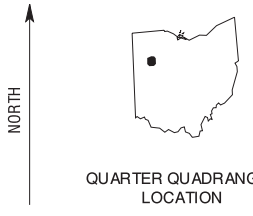
CAIRO SW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 19 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



10	11	12	10 CAIRO NW
19	21	21	11 CAIRO NE
28	29	30	12 BEAVERDAM NW
			19 CAIRO SW
			21 BEAVERDAM SW
			28 LIMA NW
			29 LIMA NE
			30 HARRIS NW

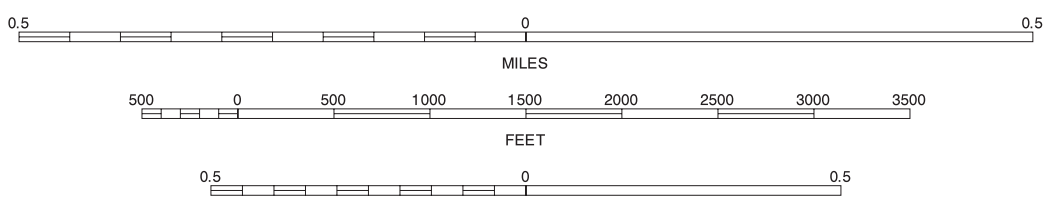
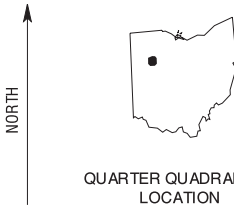
CAIRO SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 20 OF 40

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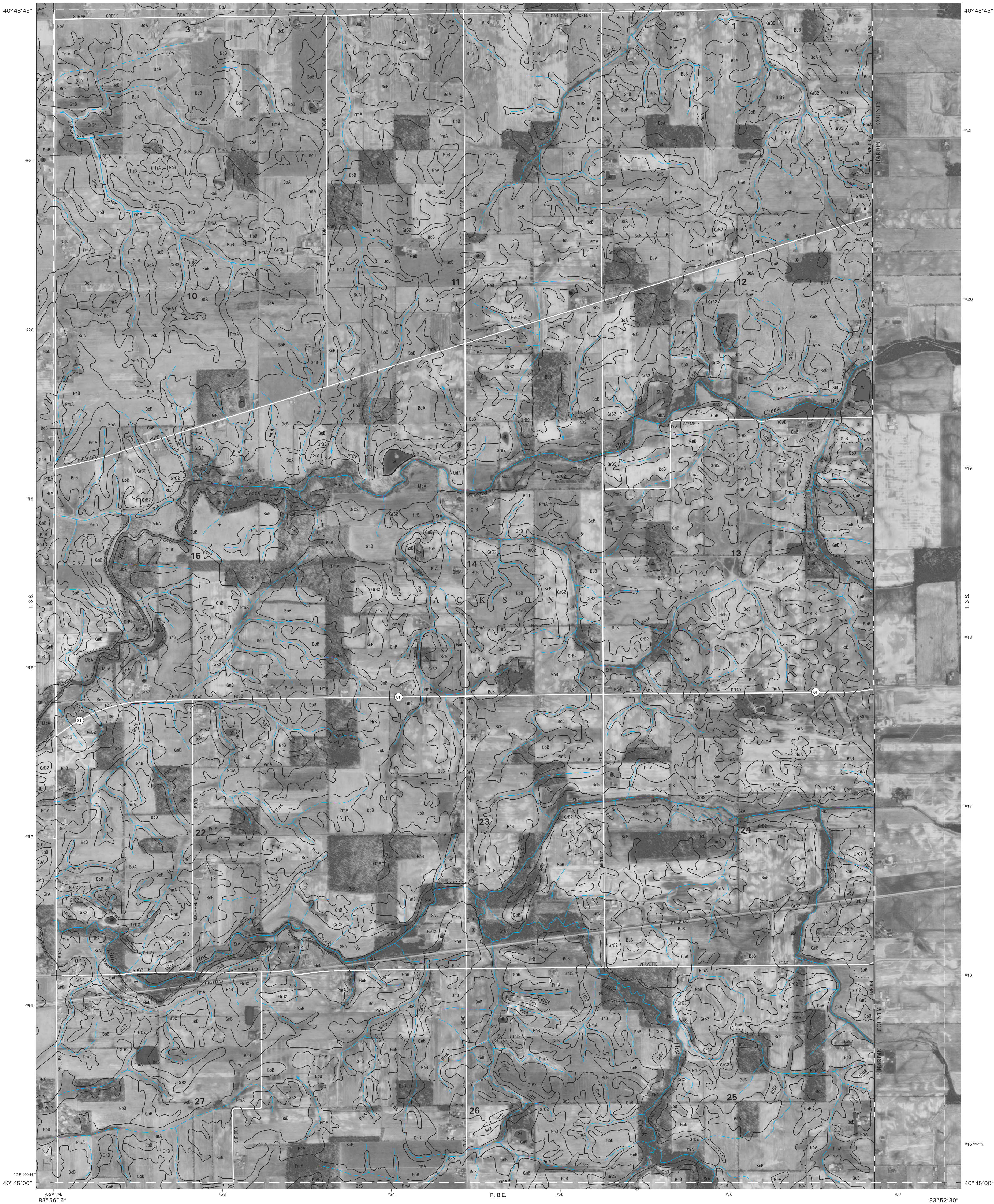
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



11	12	13	11 CARRO NE
			12 BEAVERDAM NW
			13 BEAVERDAM NE
20		22	20 CARRO SE
			22 BEAVERDAM SE
			29 LIMANE
29	30	31	30 HARRCO NW
			31 HARRCO NE

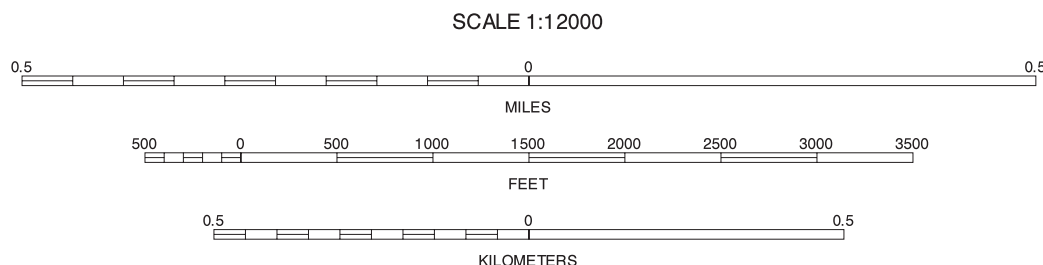
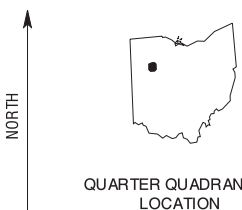
BEAVERDAM SW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 21 OF 40

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



12	13	12 BEAVERDAM NW
		13 BEAVERDAM NE
21		21 BEAVERDAM SW
30	31	30 HARRCO NW
		31 HARRCO NE

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BEAVERDAM SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 22 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.

## 84° 26' 15"

SHEET NUMBER 23 OF 40

84° 22' 30"



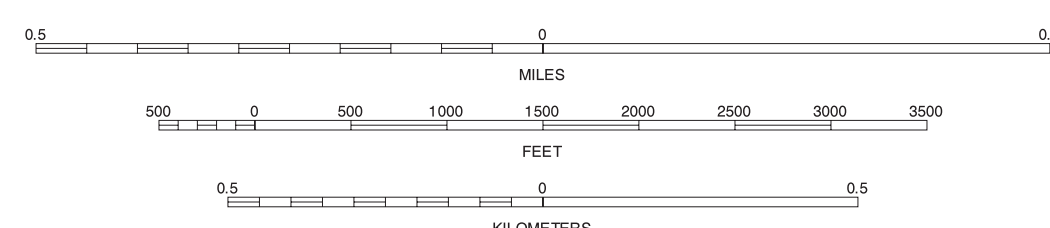
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

A map of the state of Ohio is shown. To the left of the map is a vertical arrow pointing upwards, labeled "NORTH". A small black dot is located in the western part of Ohio, representing the location of the quarter quadrangle.

QUARTER QUADRANGLE  
LOCATION

SCALE 1:12000



	14	15	14 MIDDLE POINT SE 15 DELPHOS SW
		24	24 SPENCERVILLE NW
	32	33	32 ELGIN SE 33 SPENCERVILLE SW

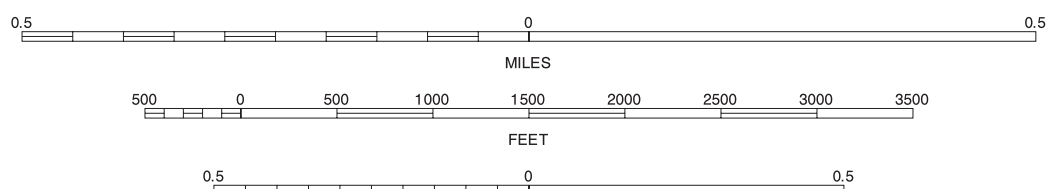
SHEET NUMBER 23 OF 40

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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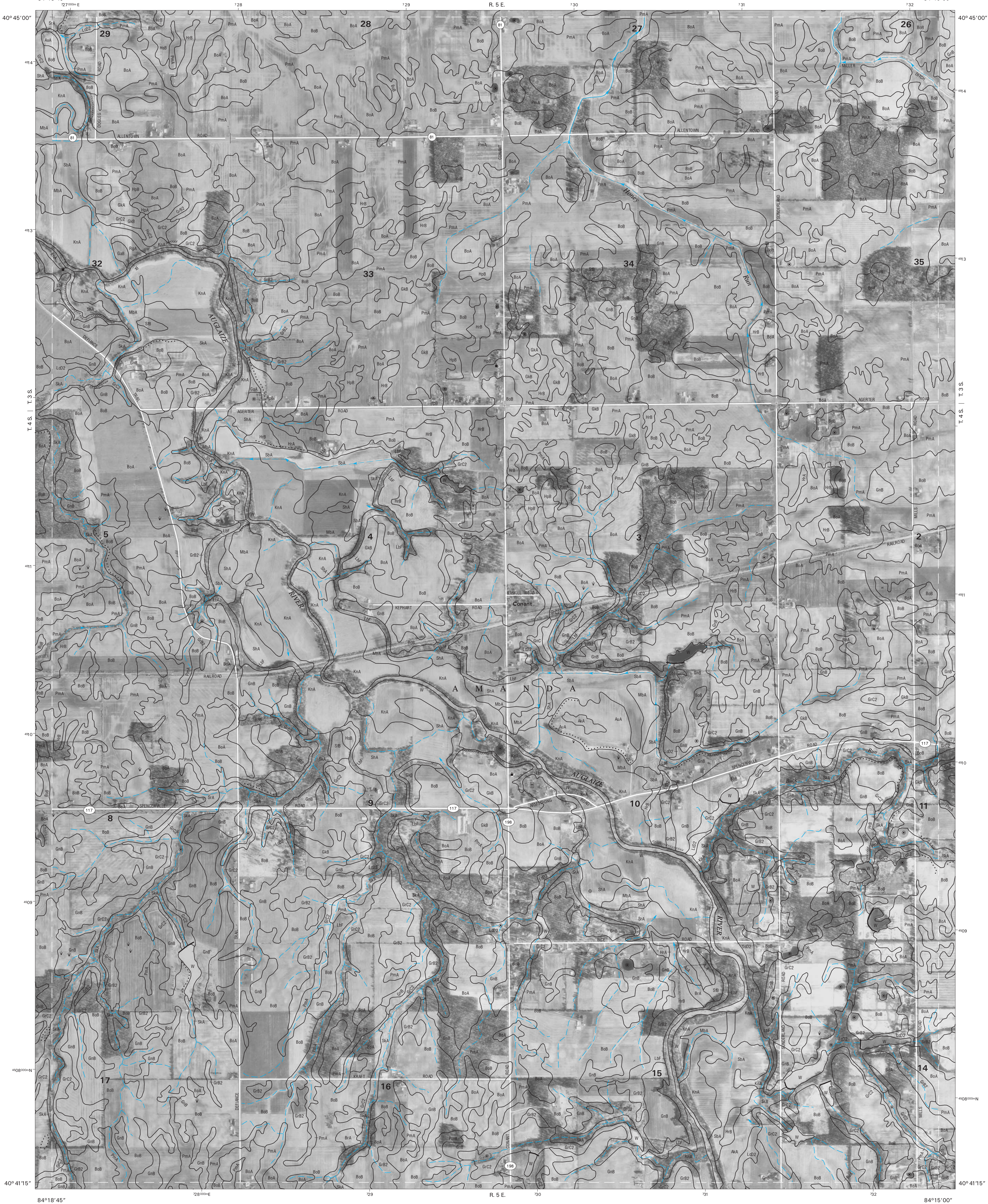
North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



14	15	16	14 MIDDLE POINT SE
23		25	15 DELPHOS SE
32	33	34	23 ELGIN NE
			25 SPENCERVILLE NE
			32 ELGIN SE
			33 SPENCERVILLE SW
			34 SPENCERVILLE SE

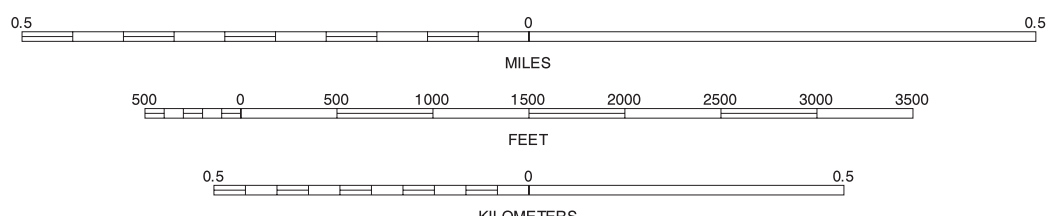
SPENCERVILLE NW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 24 OF 40

Soil map delineations extending beyond the dashed white quadrangle nealline are for reference only and are included on adjacent map sheets.



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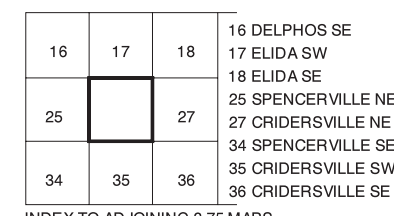
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



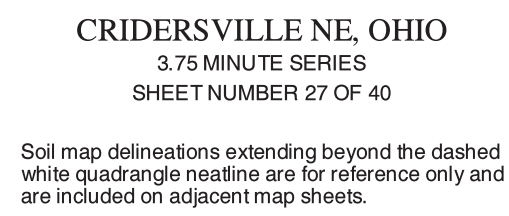
15	16	17	15 DELPHOS SW
24	25	26	16 DELPHOS SE
33	34	35	17 ELIDA SW
			24 SPENCERVILLE NW
			25 SPENCERVILLE NE
			26 CRIDERSVILLE NW
			27 CRIDERSVILLE SW
			28 CRIDERSVILLE SE
			29 CRIDERSVILLE SW
			30 CRIDERSVILLE SE
			31 CRIDERSVILLE SW

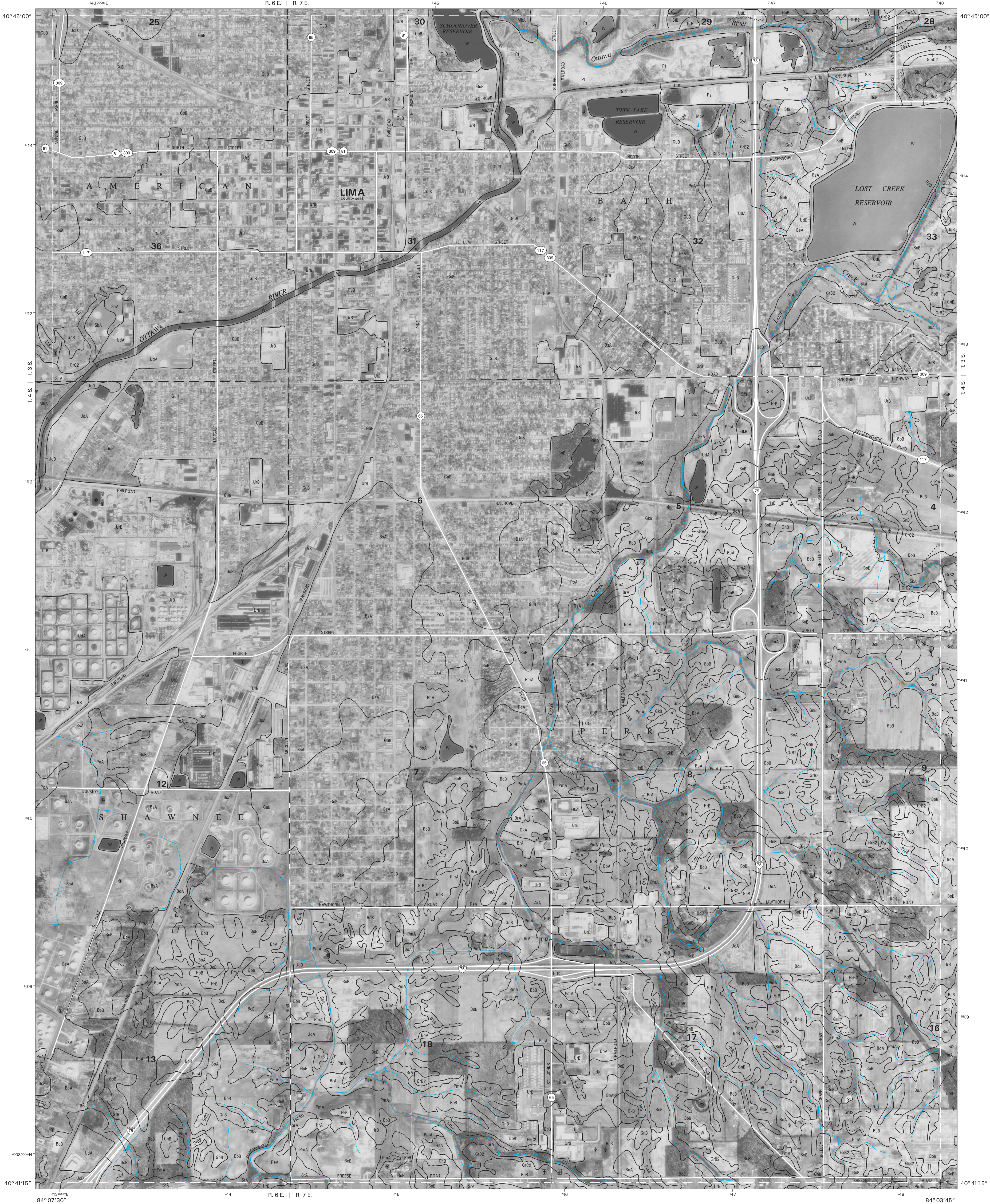
SPENCERVILLE NE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 25 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartline are for reference only and are included on adjacent map sheets.



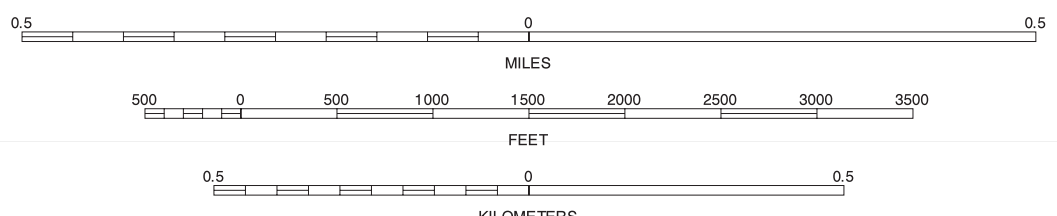
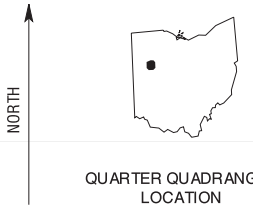
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.





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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

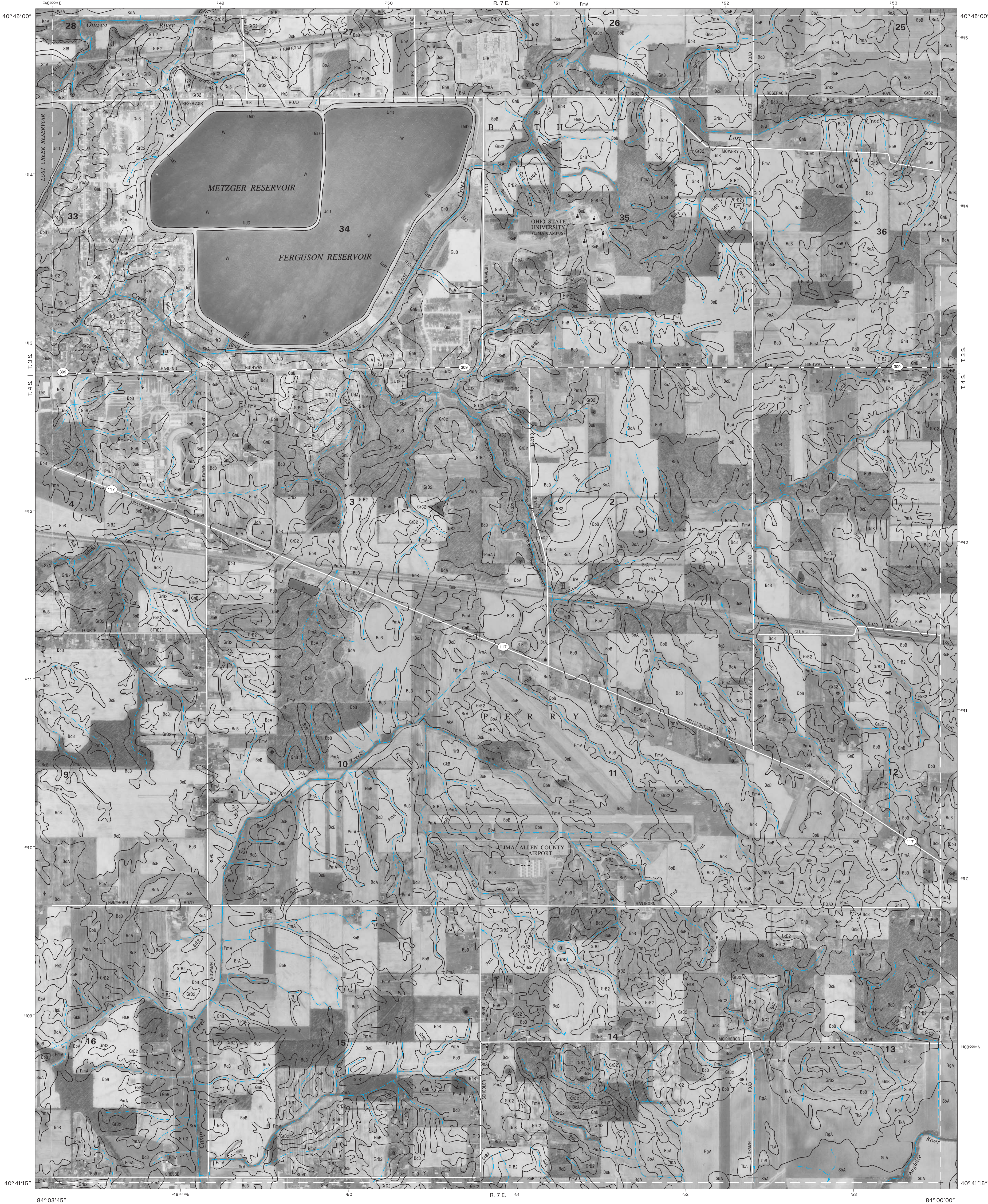


18	19	20	18 ELIDA SE
27		29	19 CARO SW
36	37	38	27 CRIDERSVILLE NE
			29 LIMA NE
			36 CRIDERSVILLE SE
			37 LIMA SW
			38 LIMA SE

INDEX TO ADJOINING 3.75 MAPS

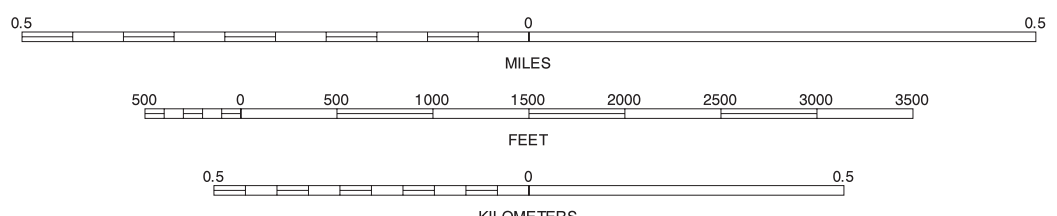
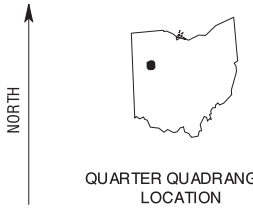
LIMA NW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 28 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

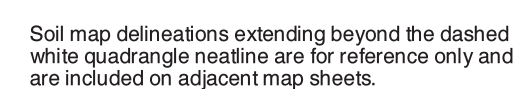


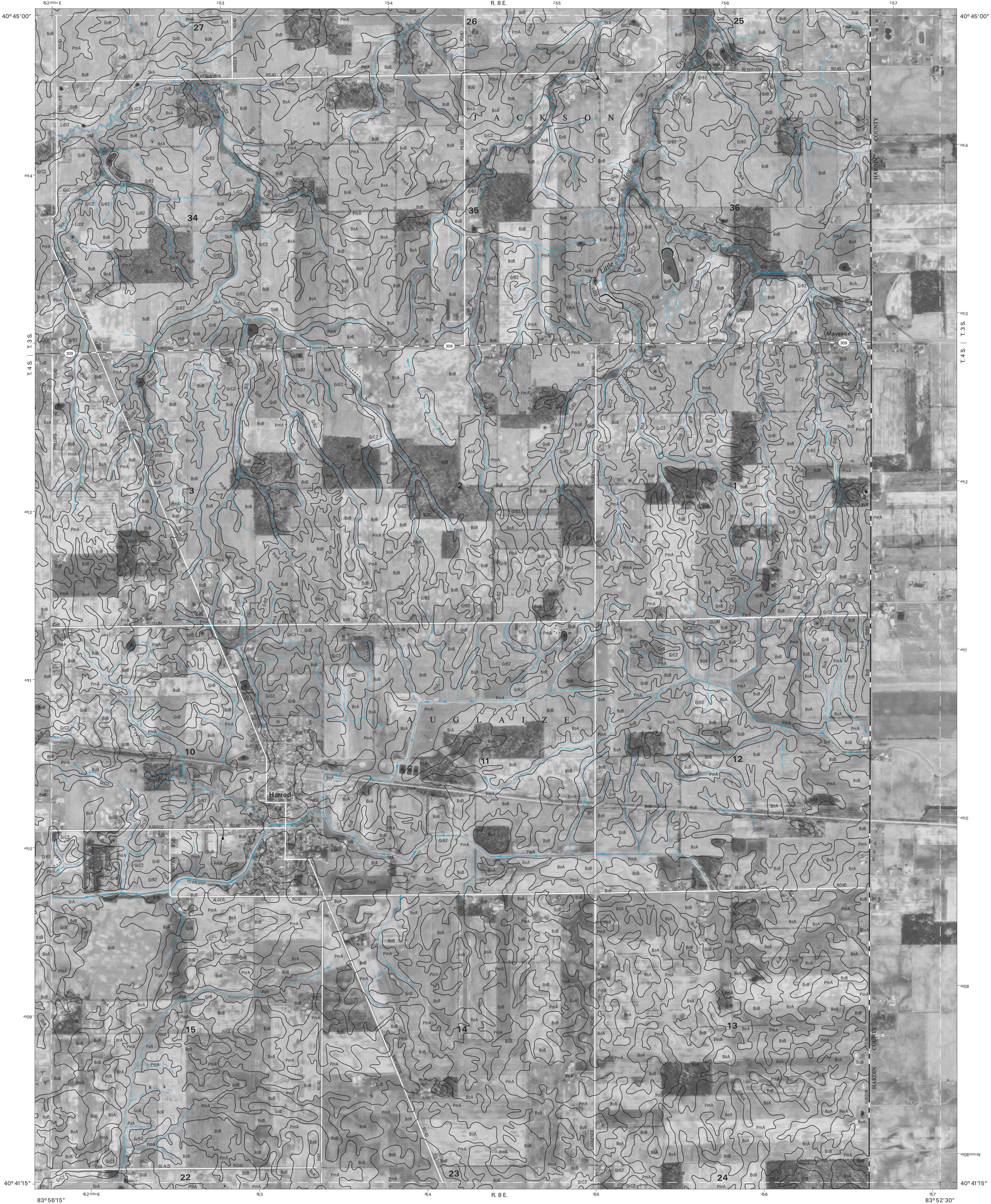
19	20	21	19 CARO SW
			20 CARO SE
			21 BEAVERDM SW
28		30	28 LIMANW
			30 HARROD NW
			37 LIMA SW
			38 LIMA SE
37	38	39	39 HARROD SW

LIMA NE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 29 OF 40

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

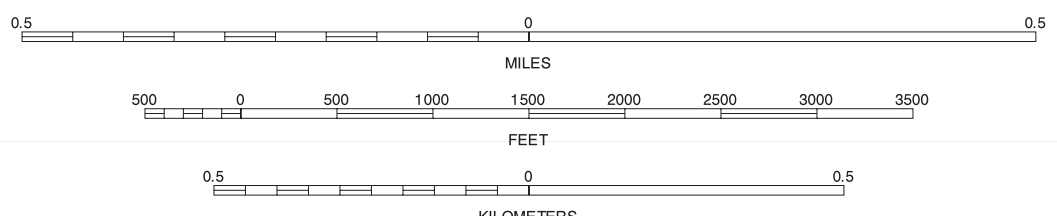
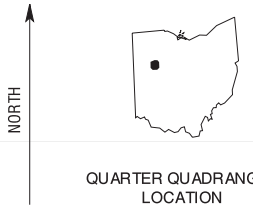
ALLEN COUNTY, OHIO  
HARROD NW QUADRANGLE  
SHEET NUMBER 30 OF 40





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North American Datum of 1983 (NAD83). GRS-90 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17, Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

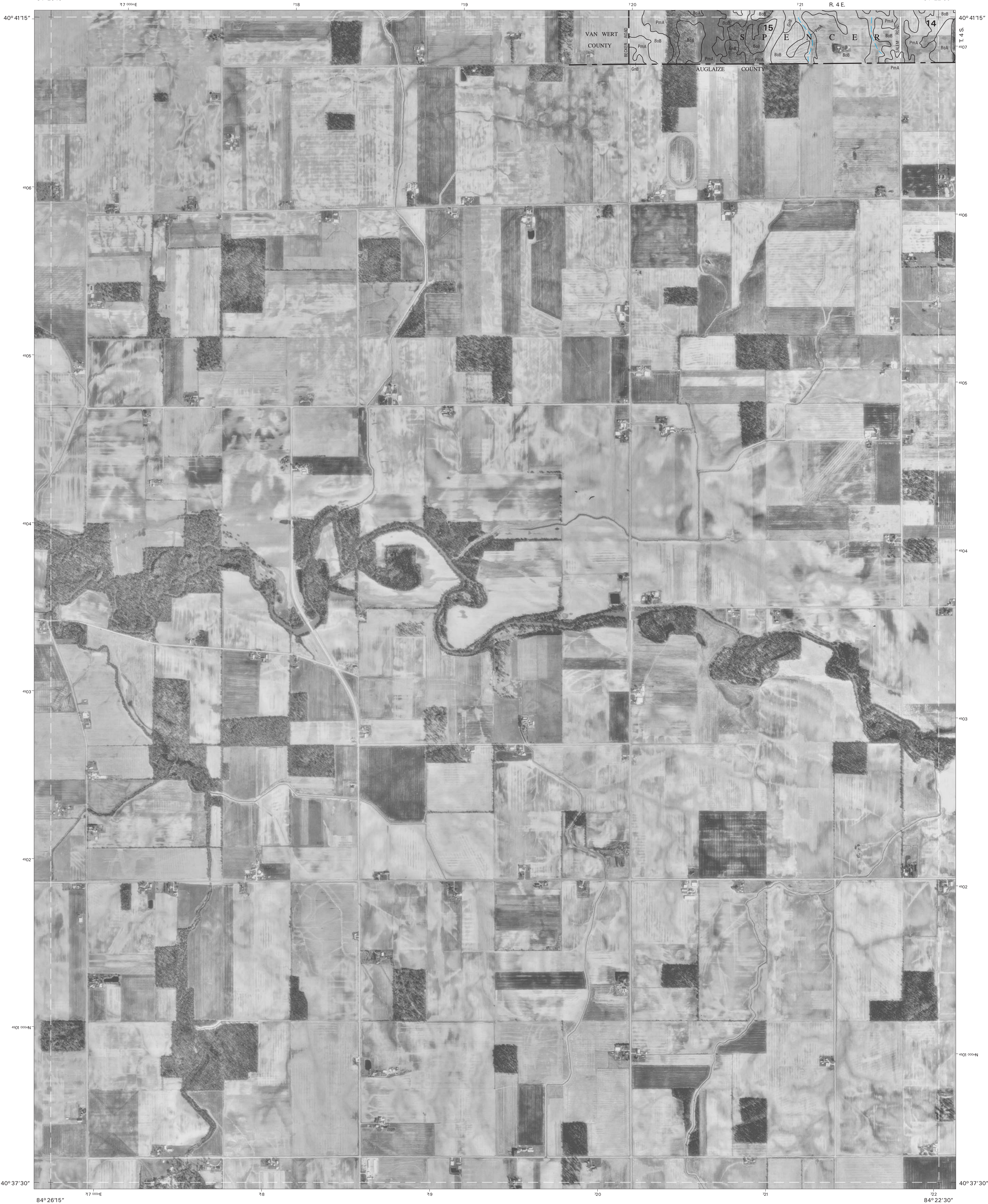


21	22	21 BEAVERDAM SW
		22 BEAVERDAM SE
30		30 HARROD NW
		39 HARROD SW
39	40	40 HARROD SE

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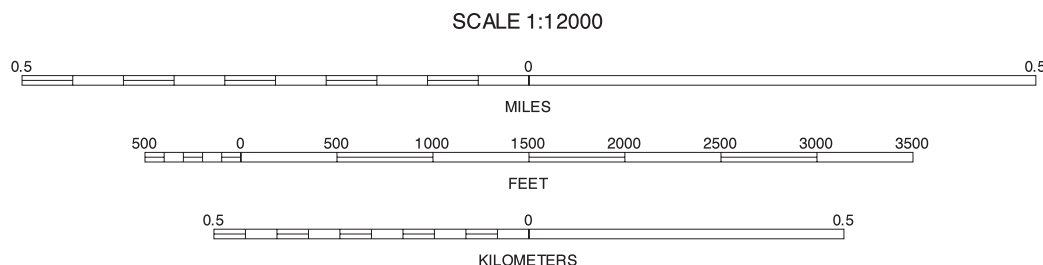
HARROD NE, OHIO  
3.75-MINUTE SERIES  
SHEET NUMBER 31 OF 40

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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



	23	24	23 ELGIN NE
			24 SPENCERVILLE NW
	33		33 SPENCERVILLE SW

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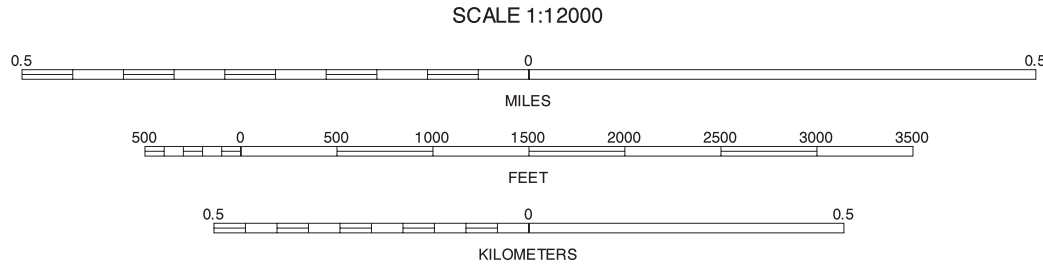
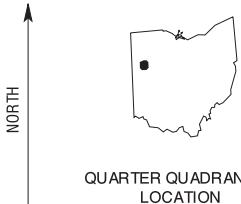
ELGIN SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 32 OF 40

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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

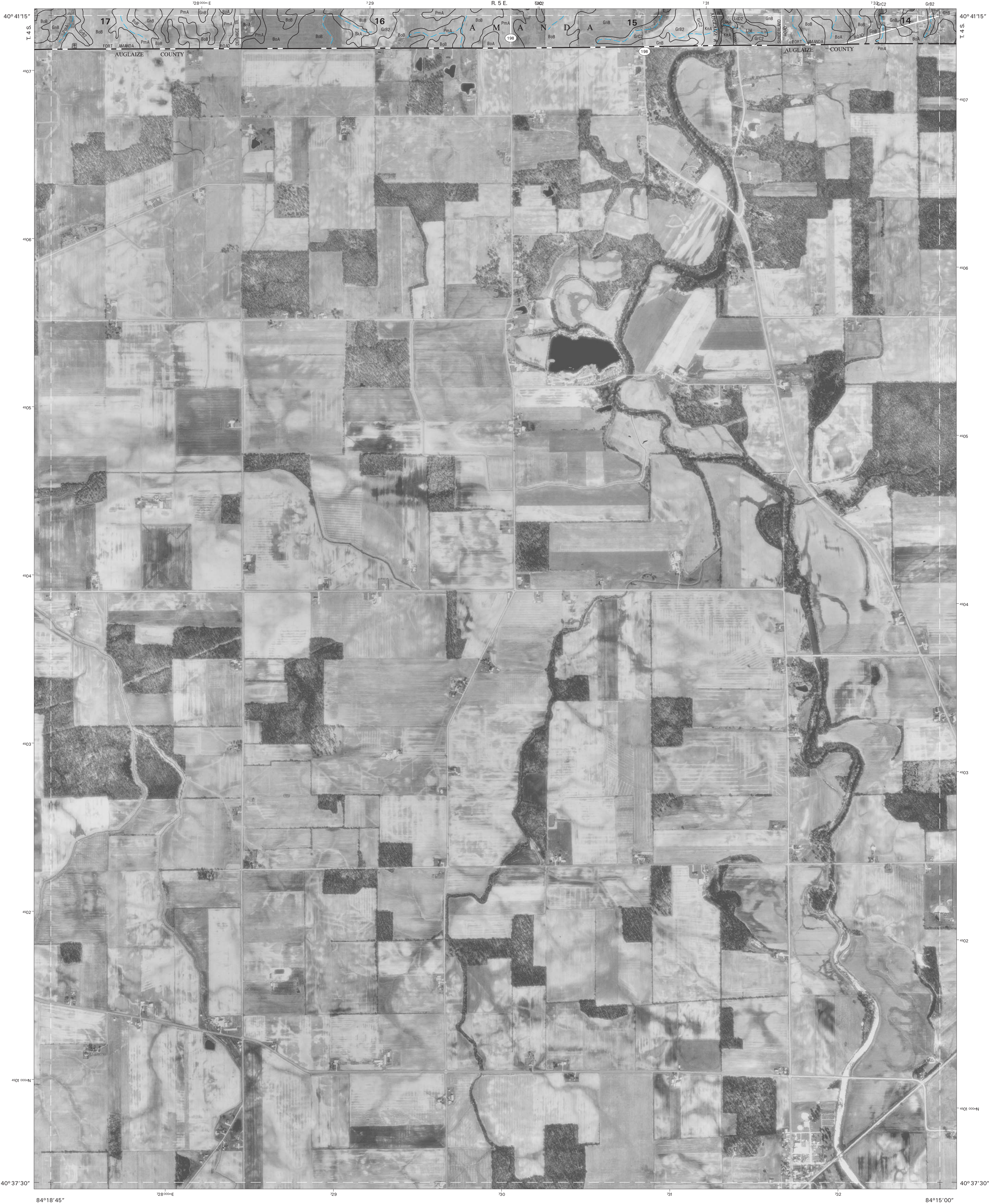


23	24	25	23 ELGIN NE 24 SPENCERVILLE NW 25 SPENCERVILLE NE 32 ELGIN SE 34 SPENCERVILLE SE
32		34	

INDEX TO ADJOINING 3.75 MAPS

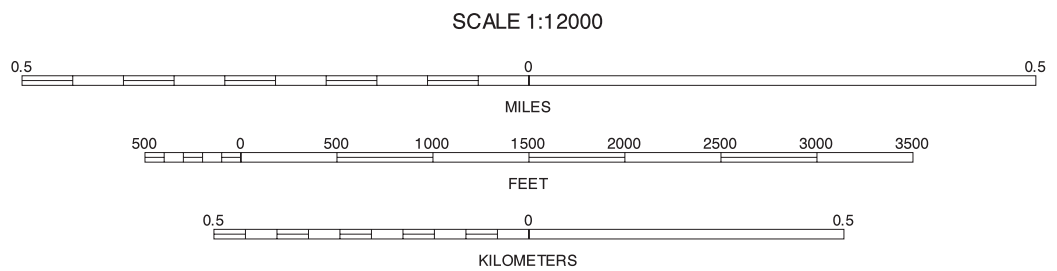
SPENCERVILLE SW, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 33 OF 40

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North American Datum of 1983 (NAD83); GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

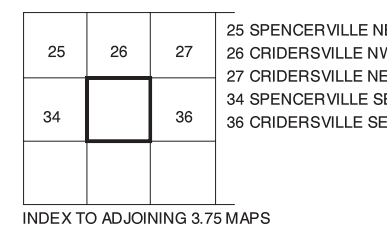


24	25	26	24 SPENCERVILLE NW
			25 SPENCERVILLE NE
			26 CRIDERSVILLE NW
33		35	33 SPENCERVILLE SW
			35 CRIDERSVILLE SW

SPENCERVILLE SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 34 OF 40

Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.

ALLEN COUNTY, OHIO  
CRIDERSVILLE SW QUADRANGLE  
SHEET NUMBER 35 OF 40  
84°11'15"

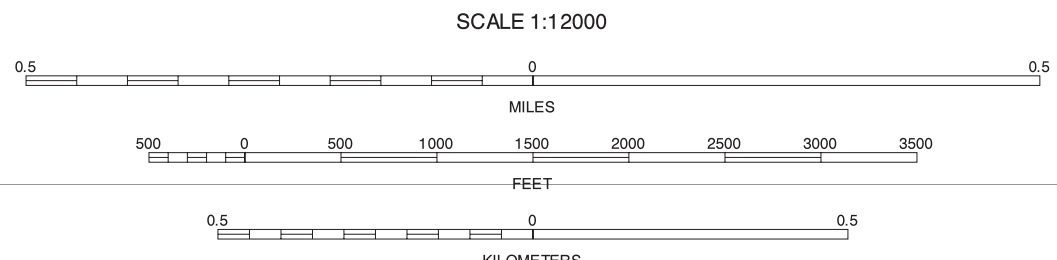
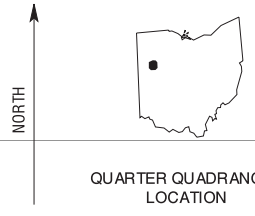


Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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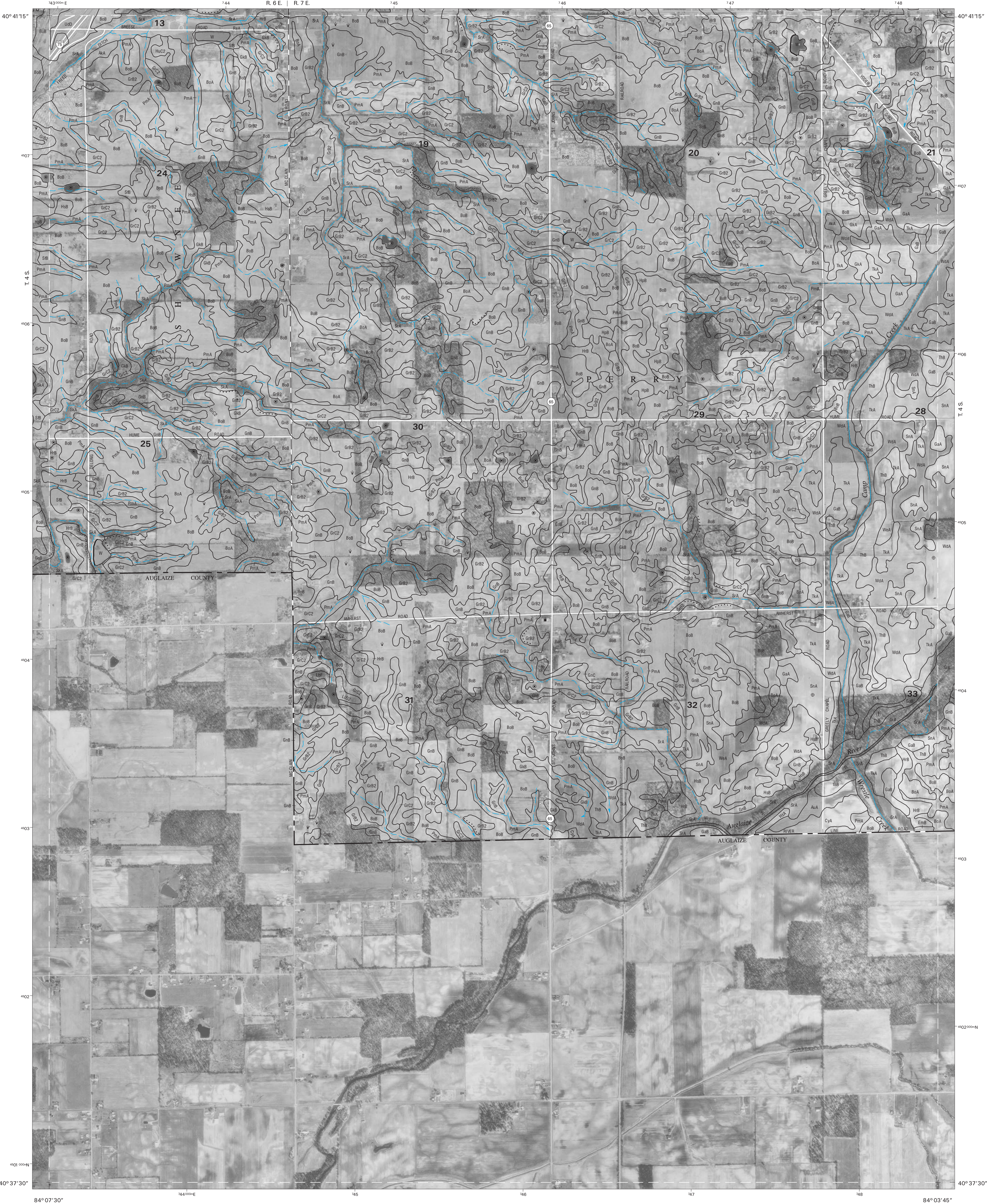
North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



26	27	28	26 CRIDERSVILLE NW
27	28	29	27 CRIDERSVILLE NE
28	29	30	28 LIMAN NW
29	30	31	29 CRIDERSVILLE SW
30	31	32	30 LIMAN SW

CRIDERSVILLE SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 36 OF 40

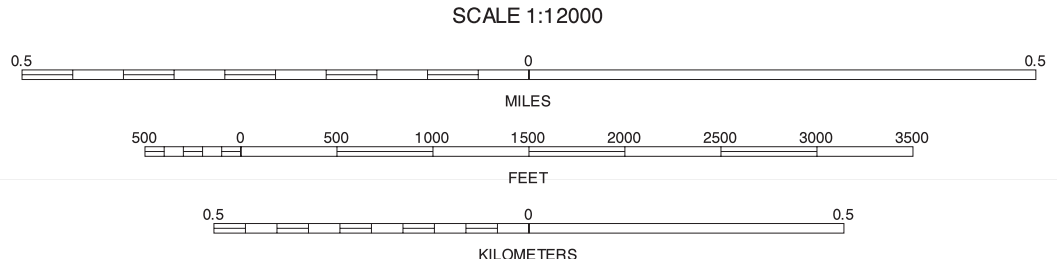
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 18, Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE  
LOCATION



27	28	29	27 CRIDERSVILLE NE
			28 LIMA NW
			29 LIMA NE
36		38	36 CRIDERSVILLE SE
			38 LIMA SE

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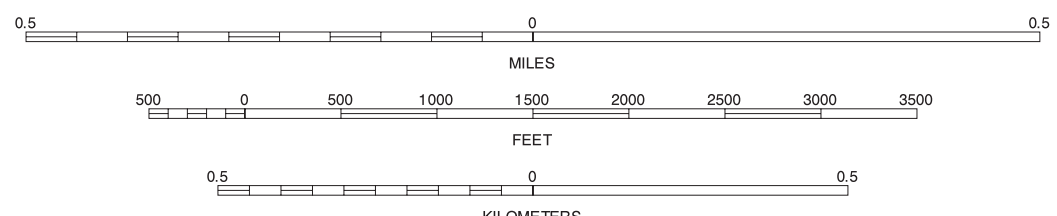
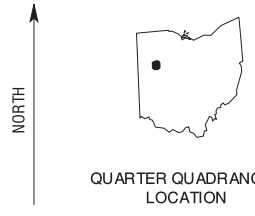
LIMA SW, OHIO  
3.75-MINUTE SERIES  
SHEET NUMBER 37 OF 40

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83); GRS-80 Spheroid 1000-meter ticks; Universal Transverse Mercator, zone 18; Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



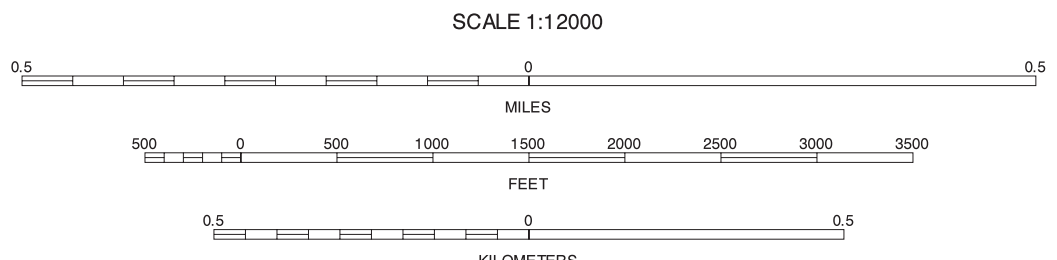
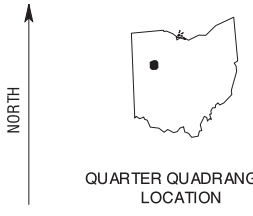
28	29	30	28 LIMANW
29	30	31	29 LIMANE
30	31	32	30 HARRCO NW
31	32	33	31 LIMASW
32	33	34	32 HARRCO SW

LIMA SE, OHIO  
3.75 MINUTE SERIES  
SHEET NUMBER 38 OF 40  
Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



29	30	31	29 LIMANE
			30 HARROD NW
			31 HARROD NE
			38 LIMANE
			40 HARROD SE

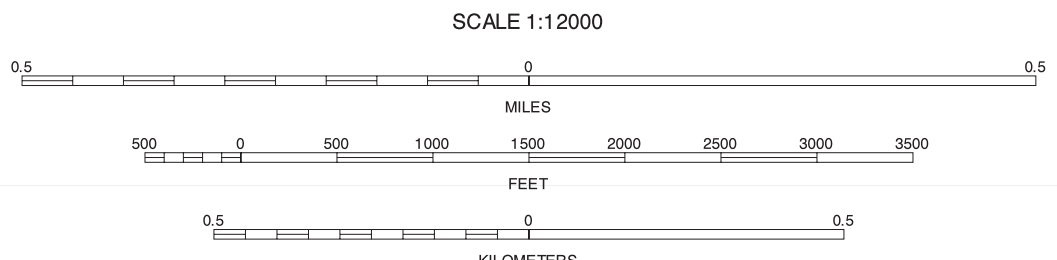
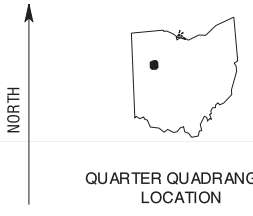
HARROD SW, OHIO  
3.75-MINUTE SERIES  
SHEET NUMBER 39 OF 40

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North American Datum of 1983 (NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



30	31	30 HARROD NW
		31 HARROD NE
39		39 HARROD SW

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Soil map delineations extending beyond the dashed white quadrangle neartine are for reference only and are included on adjacent map sheets.